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SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: John Maples Examiner #: 62294 Date: 10-30-02
Art Unit: 1745 Phone Number 308-1795 Serial Number: 09/701,950
Mail Box and Bldg/Room Location: CP3-8E12 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: _____

Inventors (please provide full names): _____

Earliest Priority Filing Date: _____

**For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

see attached

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	Type of Search	Vendors and cost where applicable
Searcher: <u>EL</u>	NA Sequence (#) _____	STN <u>\$ 70.82</u>
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Date Completed: <u>10-30-02</u>	Litigation _____	Lexis/Nexis _____
Searcher Prep & Review Time: <u>5</u>	Fulltext _____	Sequence Systems _____
Clerical Prep Time: _____	Patent Family _____	WWW/Internet _____
Online Time: <u>55</u>	Other _____	Other (specify) _____

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FILE 'REGISTRY' ENTERED AT 14:43:14 ON 30 OCT 2002
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STRUCTURE FILE UPDATES: 29 OCT 2002 HIGHEST RN 467418-81-1
DICTIONARY FILE UPDATES: 29 OCT 2002 HIGHEST RN 467418-81-1

TSCA INFORMATION NOW CURRENT THROUGH MAY 20, 2002

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Experimental and calculated property data are now available. See HELP
PROPERTIES for more information. See STNote 27, Searching Properties
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<http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf>

=> d his

(FILE 'HOME' ENTERED AT 14:15:15 ON 30 OCT 2002)

FILE 'REGISTRY' ENTERED AT 14:16:19 ON 30 OCT 2002

L1 7347 S (LI(L)P(L)O)/ELS
L2 2448 S L1 AND (T1 OR T2 OR T3)/PG
L3 991 S L2 AND O4P

FILE 'HCA' ENTERED AT 14:21:11 ON 30 OCT 2002

L4 440 S L3
L5 185627 S SINTER?
L6 267146 S ANNEAL? OR TEMPER OR TEMPERERS OR TEMPERED OR TEMPERED O
L7 174149 S BATTERY OR BATTERIES OR (ELECTROCHEM? OR ELECTROLY? OR
L8 QUE ELECTROD## OR CATHOD## OR ANOD##
L9 38429 S NONAQ# OR NONAQUEOUS? OR NONWATER? OR NONH2O OR NON(A) (
L10 390438 S ELECTROLY?
L11 42 S L4 AND L5
L12 23 S L11 AND (L7 OR L8 OR L9 OR L10 OR 52/SC,SX OR 72/SX,SC)
L13 23 S L11 AND (L7 OR L8 OR L10 OR 52/SC,SX OR 72/SC,SX)
L14 8 S L11 AND L9
L15 8 S L13 AND L14
L16 7 S L4 AND L6
L17 2 S L16 AND (L7 OR L8 OR L9 OR L10 OR 52/SC,SX OR 72/SX,SC)
L18 10 S L15 OR L17
L19 14 S L13 NOT L18
L20 5 S L16 NOT (L18 OR L19)
L21 8 S L18 AND L8

L22 10 S L18 OR L21
L23 4 S L19 AND L8
L24 10 S L19 NOT L23
L25 0 S L20 AND L8
L26 48 S L4 AND (L5 OR L6)
L27 12 S L26 AND L8
L28 0 S L27 NOT (L22 OR L23 OR L24)

FILE 'REGISTRY' ENTERED AT 14:43:14 ON 30 OCT 2002

=> file hca

FILE 'HCA' ENTERED AT 14:43:22 ON 30 OCT 2002

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FILE COVERS 1907 - 24 Oct 2002 VOL 137 ISS 18

FILE LAST UPDATED: 24 Oct 2002 (20021024/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

CAS roles have been modified effective December 16, 2001. Please check your SDI profiles to see if they need to be revised. For information on CAS roles, enter HELP ROLES at an arrow prompt or use the CAS Roles thesaurus (/RL field) in this file.

=> d l22 1-10 cbib abs hitstr hitind

L22 ANSWER 1 OF 10 HCA COPYRIGHT 2002 ACS

136:297395 Method for fabrication of **cathode** active material and a **nonaqueous electrolyte battery**.

Hosoya, Mamoru; Fukushima, Yuzuru; Sakai, Hidecki; Kuyama, Junji (Sony Corporation, Japan). Eur. Pat. Appl. EP 1195827 A2 20020410, 31 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXWDW. APPLICATION: EP 2001-123894 20011005. PRIORITY: JP 2000-308300 20001006; JP 2000-308313 20001006.

AB The invention comprises a method for producing a **cathode** active material having superior cell characteristics through single-phase synthesis of a composite material composed of a compd.

represented by the general formula $\text{Li}_x\text{Fe}_1\text{-yMyPO}_4$ and a carbon material pos. and a method for producing a **non-aq** . **electrolyte cell** employing the so produced **cathode** active material. To this end, the **cathode** active material is prepd. by a step of mixing the starting materials for synthesis of the compd. represented by the general formula $\text{Li}_x\text{Fe}_1\text{-yMyPO}_4$, a step of milling a mixt. obtained by the mixing step, a step of compressing the mixt. obtained by the mixing step to a preset d. and a step of **sintering** the mixt. obtained by the compressing step. A carbon material is added in any one of the above steps prior to the **sintering** step. The d. of the mixt. in the compressing step is set to not less than 1.71 g/cm³ and not larger than 2.45 g/cm³.

IT 198782-39-7, Iron lithium phosphate ($\text{FeLi}_{0.1}(\text{PO}_4)$)
 407606-22-8, Chromium iron lithium phosphate
 ($\text{Cr}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$) 407606-24-0, Cobalt iron
 lithium phosphate ($\text{Co}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$)
 407606-26-2, Copper iron lithium phosphate
 ($\text{Cu}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$) 407606-28-4, Aluminum iron
 lithium phosphate ($\text{Al}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$)
 407606-30-8, Gallium iron lithium phosphate
 ($\text{Ga}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$) 407606-32-0, Boron iron
 lithium phosphate ($\text{B}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$) 407606-34-2
 , Iron lithium manganese phosphate ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Mn}_{0.08}(\text{PO}_4)$)
 407606-36-4, Iron lithium nickel phosphate
 ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Ni}_{0.08}(\text{PO}_4)$) 407606-39-7, Iron lithium
 vanadium phosphate ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{V}_{0.08}(\text{PO}_4)$)
 407606-42-2, Iron lithium molybdenum phosphate
 ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Mo}_{0.08}(\text{PO}_4)$) 407606-44-4, Iron lithium
 titanium phosphate ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Ti}_{0.08}(\text{PO}_4)$)
 407606-47-7, Iron lithium zinc phosphate
 ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Zn}_{0.08}(\text{PO}_4)$) 407606-49-9, Iron lithium
 magnesium phosphate ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Mg}_{0.08}(\text{PO}_4)$)
 407606-51-3, Iron lithium niobium phosphate
 ($\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}\text{Nb}_{0.08}(\text{PO}_4)$)
 (method for fabrication of **cathode** active material and
nonaq. electrolyte battery)

RN 198782-39-7 HCA

CN Iron lithium phosphate ($\text{FeLi}_{0.1}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

RN 407606-22-8 HCA

CN Chromium iron lithium phosphate ($\text{Cr}_{0.08}\text{Fe}_{0.2-1}\text{Li}_{0.05-1.2}(\text{PO}_4)$)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component
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		Registry Number
=====	=====	=====
O4P	1	14265-44-2
Cr	0 - 0.8	7440-47-3
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-24-0 HCA

CN Cobalt iron lithium phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Co	0 - 0.8	7440-48-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-26-2 HCA

CN Copper iron lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Cu	0 - 0.8	7440-50-8
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-28-4 HCA

CN Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4))
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6
Al	0 - 0.8	7429-90-5

RN 407606-30-8 HCA

CN Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ga	0 - 0.8	7440-55-3

Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-32-0 HCA

CN Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
B	0 - 0.8	7440-42-8
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-34-2 HCA

CN Iron lithium manganese phosphate (Fe0.2-1Li0.05-1.2Mn0-0.8(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Mn	0 - 0.8	7439-96-5
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-36-4 HCA

CN Iron lithium nickel phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
Ni	0 - 0.8	7440-02-0
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-39-7 HCA

CN Iron lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4)) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	1	14265-44-2
V	0 - 0.8	7440-62-2
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-42-2 HCA

CN Iron lithium molybdenum phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Mo}_{0.8}(\text{PO}_4)$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mo	0 - 0.8	7439-98-7
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-44-4 HCA

CN Iron lithium titanium phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Ti}_{0.8}(\text{PO}_4)$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Ti	0 - 0.8	7440-32-6
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-47-7 HCA

CN Iron lithium zinc phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Zn}_{0.8}(\text{PO}_4)$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Zn	0 - 0.8	7440-66-6
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-49-9 HCA

CN Iron lithium magnesium phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Mg}_{0.8}(\text{PO}_4)$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Mg	0 - 0.8	7439-95-4
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

RN 407606-51-3 HCA

CN Iron lithium niobium phosphate ($\text{Fe}_{0.2}\text{-Li}_{0.05}\text{-1.2Nb}_{0.8}(\text{PO}_4)$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component
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		Registry Number
=====	=====	=====
O4P	1	14265-44-2
Nb	0 - 0.8	7440-03-1
Li	0.05 - 1.2	7439-93-2
Fe	0.2 - 1	7439-89-6

IC ICM H01M004-58
ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **cathode active material nonaq electrolyte battery**

IT Ball milling
Battery cathodes
Composites
Secondary batteries
(method for fabrication of **cathode active material and nonaq. electrolyte battery**)

IT Carbon black, uses
(method for fabrication of **cathode active material and nonaq. electrolyte battery**)

IT 7440-44-0, Carbon, uses 198782-39-7, Iron lithium phosphate (FeLi0-1(PO4)) 407606-22-8, Chromium iron lithium phosphate (Cr0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-24-0, Cobalt iron lithium phosphate (Co0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-26-2, Copper iron lithium phosphate (Cu0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-28-4, Aluminum iron lithium phosphate (Al0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-30-8, Gallium iron lithium phosphate (Ga0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-32-0, Boron iron lithium phosphate (B0-0.8Fe0.2-1Li0.05-1.2(PO4)) 407606-34-2, Iron lithium manganese phosphate (Fe0.2-1Li0.05-1.2Mn0-0.8(PO4)) 407606-36-4, Iron lithium nickel phosphate (Fe0.2-1Li0.05-1.2Ni0-0.8(PO4)) 407606-39-7, Iron lithium vanadium phosphate (Fe0.2-1Li0.05-1.2V0-0.8(PO4)) 407606-42-2, Iron lithium molybdenum phosphate (Fe0.2-1Li0.05-1.2Mo0-0.8(PO4)) 407606-44-4, Iron lithium titanium phosphate (Fe0.2-1Li0.05-1.2Ti0-0.8(PO4)) 407606-47-7, Iron lithium zinc phosphate (Fe0.2-1Li0.05-1.2Zn0-0.8(PO4)) 407606-49-9, Iron lithium magnesium phosphate (Fe0.2-1Li0.05-1.2Mg0-0.8(PO4)) 407606-51-3, Iron lithium niobium phosphate (Fe0.2-1Li0.05-1.2Nb0-0.8(PO4)) 407629-87-2 407629-90-7 407629-95-2 407630-01-7 407630-10-8 407630-14-2
(method for fabrication of **cathode active material and nonaq. electrolyte battery**)

IT 15365-14-7P, Iron lithium phosphate FeLiPO4
(method for fabrication of **cathode active material and nonaq. electrolyte battery**)

IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer

(method for fabrication of **cathode** active material and
nonaq. electrolyte battery)

L22 ANSWER 2 OF 10 HCA COPYRIGHT 2002 ACS

136:281939 **Nonaqueous electrolyte battery**

cathode active material capable of reversibly
doping/undoping lithium. Hosoya, Mamoru; Takahashi, Kimio;
Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP
1193787 A2 20020403, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE,
DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI,
RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123181
20010927. PRIORITY: JP 2000-301399 20000929.

AB An LiFePO_4 carbon composite material is to be synthesized in a
single phase to realize superior cell characteristics. To this end,
in the prepn. of a **cathode** active material, starting
materials for synthesis of a compd. having the formula Li_xFePO_4 ,
where $0 < x \leq 1$, are mixed together, milled and
sintered. A carbon material is added at one of these steps.
As the starting materials for synthesis for Li_xFePO_4 , Li_3PO_4 ,
 Fe_3PO_4 , $\text{Fe}_3(\text{PO}_4)_2$ or its hydrate $\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$, where n is
the no. of hydrates, are used, and the content of Fe^{3+} in the total
iron in $\text{Fe}_3(\text{PO}_4)_2$ or its hydrate $\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$ is set to 61
wt% or less.

IT 198782-39-7P, Iron lithium phosphate ($\text{FeLi}_{0-1}(\text{PO}_4)$)

(**nonaq. electrolyte battery**)

cathode active material capable of reversibly
doping/undoping lithium)

RN 198782-39-7 HCA

CN Iron lithium phosphate ($\text{FeLi}_{0-1}(\text{PO}_4)$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58

ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)

ST **battery cathode** lithium iron phosphate carbon
composite

IT Secondary **batteries**

(lithium; **nonaq. electrolyte battery**)

cathode active material capable of reversibly
doping/undoping lithium)

IT Ball milling

Battery cathodes

Composites

Sintering

(**nonaq. electrolyte battery**)

- cathode** active material capable of reversibly doping/undoping lithium)
- IT Carbonaceous materials (technological products)
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)
- IT Fluoropolymers, uses
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)
- IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate
10045-86-0, Ferric phosphate 10377-52-3, Lithium phosphate Li_3PO_4
31096-55-6
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate
7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7782-42-5,
Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride
copolymer 15365-14-7, Iron lithium phosphate FeLiPO_4 21324-40-3,
Lithium hexafluorophosphate
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)
- IT 24937-79-9, PvdF
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)
- IT 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)
- IT 872-36-6, Vinylene carbonate
(**nonaq. electrolyte battery**
cathode active material capable of reversibly doping/undoping lithium)

L22 ANSWER 3 OF 10 HCA COPYRIGHT 2002 ACS

136:281938 **Nonaqueous electrolyte battery**

cathode active material capable of reversibly doping/undoping lithium. Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1193786 A2 20020403, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-123180 20010927. PRIORITY: JP 2000-301401 20000929.

AB A LiFePO_4 carbon composite material is to be synthesized in a single phase satisfactorily to achieve superior cell characteristics. In prepg. a **cathode** active material, starting materials for synthesis of a compd. represented by the general formula Li_xFePO_4 , where $0 < x \leq 1$, are mixed, milled and a carbon material is added to the resulting mass at an optional time point in the course

of mixing, milling and **sintering**. Li_3PO_4 , $\text{Fe}_3(\text{PO}_4)_2$ or its hydrates $\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$, where n denotes the no. of hydrates, are used as the starting materials for synthesis of Li_xFePO_4 . The temp. of a product from the **sintering** is set to 305.degree. or less when the product from the **sintering** is exposed to atm. The oxygen concn. in a **sintering** atm. is set to 1012 ppm in vol. or less at the time point of **sintering**.

IT 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
 RN 198782-39-7 HCA
 CN Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
 ICS H01M010-40
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy
 Technology)
 ST battery cathode lithium iron phosphate carbon
 composite
 IT Secondary batteries
 (lithium; nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
 IT Battery cathodes
 Composites
 Sintering
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
 IT Carbon black, uses
 Carbonaceous materials (technological products)
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
 IT Fluoropolymers, uses
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
 IT Ball milling
 (planetary; nonaq. electrolyte
 battery cathode active material capable of
 reversibly doping/undoping lithium)
 IT 10028-23-6, Phosphoric acid, iron(2+) salt (2:3) octahydrate

- 10377-52-3, Lithium phosphate 14940-41-1, Iron phosphate $\text{Fe}_3(\text{PO}_4)_2$
 31096-55-6
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
- IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate
 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses 7782-42-5,
 Graphite, uses 21324-40-3, Lithium hexafluorophosphate
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
- IT 872-36-6, Vinylene carbonate 7440-44-0, Carbon, uses 9011-17-0,
 Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9,
 Poly(vinylidene fluoride)
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
- IT 15365-14-7P, Iron lithium phosphate $\text{FeLiO-1(PO}_4\text{)}$ 198782-39-7P,
 Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)
- IT 7782-44-7, Oxygen, uses
 (nonaq. electrolyte battery
 cathode active material capable of reversibly
 doping/undoping lithium)

L22 ANSWER 4 OF 10 HCA COPYRIGHT 2002 ACS

136:281937 **Nonaqueous electrolyte battery**

with cathode active material capable of reversibly
 doping/undoping lithium. Hosoya, Mamoru; Takahashi, Kimio;
 Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP
 1193785 A2 20020403, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE,
 DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI,
 RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-122769
 20010921. PRIORITY: JP 2000-301402 20000929.

- AB A LiFePO_4 carbon composite material is to be synthesized in a single
 phase satisfactorily to prevent the deterioration of the performance
 of the cathode active material from occurring and achieve
 superior cell characteristics. In prepg. a cathode active
 material, starting materials for synthesis of a compd. represented
 by the general formula Li_xFePO_4 , where $0 < x \leq 1$, are mixed,
 milled and a carbon material is added to the resulting mass at an
 optional time point in the course of mixing, milling and
sintering. Li_3PO_4 , $\text{Fe}_3(\text{PO}_4)_2$ or its hydrates
 $\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$, where n denotes the no. of hydrates, are used
 as the starting materials for synthesis of Li_xFePO_4 . The temp. of a
 product from the **sintering** is set to 305.degree. or less
 when the product from the **sintering** is exposed to atm.
- IT 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
 (nonaq. electrolyte battery with
 cathode active material capable of reversibly

doping/undoping lithium)
 RN 198782-39-7 HCA
 CN Iron lithium phosphate (FeLiO-1(PO4)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

IC ICM H01M004-58
 ICS H01M010-40
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST **battery cathode** lithium iron phosphate carbon composite
 IT Secondary **batteries**
 (lithium; **nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT **Battery cathodes**
 Composites
 (**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT Carbonaceous materials (technological products)
 (**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT Fluoropolymers, uses
 (**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT Ball milling
 (planetary; **nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT 10377-52-3, Lithium phosphate Li_3PO_4 14940-41-1, Iron phosphate $\text{Fe}_3(\text{PO}_4)_2$ 31096-55-6
 (**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 872-36-6, Vinylene carbonate 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
 (**nonaq. electrolyte battery** with **cathode** active material capable of reversibly doping/undoping lithium)
 IT 7440-44-0, Carbon, uses 24937-79-9, PvdF

- (**nonaq. electrolyte battery** with
cathode active material capable of reversibly
doping/undoping lithium)
- IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 **198782-39-7P**,
Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
(**nonaq. electrolyte battery** with
cathode active material capable of reversibly
doping/undoping lithium)
- L22 ANSWER 5 OF 10 HCA COPYRIGHT 2002 ACS
136:265826 Method for the preparation of **cathode** active
material for a **nonaqueous electrolyte**
battery. Hosoya, Mamoru; Takahashi, Kimio; Fukushima,
Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1193784 A2
20020403, 16 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR,
GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO.
(English). CODEN: EPXXDW. APPLICATION: EP 2001-122752 20010921.
PRIORITY: JP 2000-301403 20000929.
- AB A LiFePO_4 carbon composite material is to be synthesized in a single
phase satisfactorily to achieve superior cell characteristics. In
prepg. a **cathode** active material, a starting material for
synthesis of a compd. represented by the general formula Li_xFePO_4 ,
where $0 < x < 1$, is mixed, milled and **sintered**
and a carbon material is added to the resulting mass at an optional
time point in the course of mixing, milling and **sintering**.
 Li_3PO_4 , $\text{Fe}_3(\text{PO}_4)_2$ or its hydrates $\text{Fe}_3(\text{PO}_4)_2 \cdot n\text{H}_2\text{O}$, where n
denotes the no. of hydrates, are used as the starting material for
synthesis of Li_xFePO_4 . The particle size distribution of particles
of the starting material for synthesis following the milling with
the particle size not less than 3 μm is set to 2.2% or less in
terms of the volumetric integration frequency.
- IT **198782-39-7P**, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
(method for prepn. of **cathode** active material for
nonaq. electrolyte battery)
- RN 198782-39-7 HCA
CN Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2
Li	0 - 1	7439-93-2
Fe	1	7439-89-6

- IC -ICM H01M004-58
ICS H01M010-40
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)
- ST **battery cathode** lithium iron phosphate carbon
composite
- IT Secondary **batteries**
(lithium; method for prepn. of **cathode** active material)

- for **nonaq. electrolyte battery**)
- IT **Battery cathodes**
Particle size distribution
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- IT Carbon black, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- IT Ball milling
(planetary; method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 21324-40-3, Lithium hexafluorophosphate
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- IT 7440-44-0, Carbon, uses
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- IT 15365-14-7P, Iron lithium phosphate FeLiPO_4 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- L22 ANSWER 6 OF 10 HCA COPYRIGHT 2002 ACS
- 136:203096 Method for preparation of **cathode** active material for **nonaqueous electrolyte battery**.
Hosoya, Mamoru; Takahashi, Kimio; Fukushima, Yuzuru (Sony Corporation, Japan). Eur. Pat. Appl. EP 1184920 A2 20020306, 21 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-120637 20010830. PRIORITY: JP 2000-261277 20000830.
- AB A **cathode** active material improved in electron cond. and a **non-aq. electrolyte cell** employing this **cathode** active material and which is improved in cell capacity and cyclic characteristics are disclosed. The **cathode** active material is composed of a compd. having the general formula Li_xFePO_4 where $0 < x \leq 1.0$, and a carbon material, with the carbon content per unit wt. being not less than 3 wt% and with the powder d. being not lower than 2.2 g/cm³.
- IT 198782-39-7P, Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$)
(method for prepn. of **cathode** active material for **nonaq. electrolyte battery**)
- RN 198782-39-7 HCA
- CN Iron lithium phosphate ($\text{FeLiO-1(PO}_4\text{)}$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	1	14265-44-2

Li		0 - 1	7439-93-2
Fe		1	7439-89-6

IC ICM H01M004-58
 ICS H01M004-62; H01M004-04
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST **cathode active material prepn nonaq electrolyte battery**
 IT Secondary **batteries**
 (lithium; method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT **Battery cathodes**
Sintering
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT Carbonaceous materials (technological products)
 Fluoropolymers, uses
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT Carbon black, uses
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT 10045-86-0, Phosphoric acid, iron(3+) salt (1:1) 10377-52-3,
 Lithium phosphate
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate
 616-38-6, Dimethyl carbonate 7439-93-2, Lithium, uses
 21324-40-3, Lithium hexafluorophosphate
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT 24937-79-9, PvdF
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT 15365-14-7P, Iron lithium phosphate FeLiPO₄ 198782-39-7P,
 Iron lithium phosphate (FeLiO-1(PO₄))
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)
 IT 7440-44-0, Carbon, uses
 (method for prepn. of **cathode active material for nonaq. electrolyte battery**)

L22 ANSWER 7 OF 10 HCA COPYRIGHT 2002 ACS
 135:347775 Li₃Sc₂-xFex(PO₄)₃ thin films and powders prepared by
 ultrasonic spray pyrolysis. Ivanov-Schitz, A. K.; Nistuk, A. V.;
 Demianets, L. N.; Chaban, N. G. (Institute of Crystallography,
 Russian Academy of Science, Moscow, Russia). Solid State Ionics,
 144(1,2), 133-141 (English) 2001. CODEN: SSIOD3. ISSN: 0167-2738.
 Publisher: Elsevier Science B.V..
 AB Thin films of Li₃Sc₂-xFex(PO₄)₃ (x=0.5, 2) solid
electrolytes have been prepd. on quartz glass substrates by

ultrasonic spray pyrolysis (USP) using aq. solns. of LiH_2PO_4 , $\text{Sc}(\text{NO}_3)_3$ and $\text{Fe}(\text{NO}_3)_3$ at substrate temp. of 500-700.degree.C. The amorphous as-deposited films were converted into cryst. materials by heat treatment at 800-1000.degree.C. The optimal deposition parameters for formation of uniform precursor films with good adhesion to the substrate were detd. The dense films composed of fine columnar grains were obtained using the 3 cycles of deposition and **annealing**. The room temp. ionic cond. of the film with the compn. $x=0.5$ was 5.times.10⁻⁶ S/cm. The superionic .gamma.-phase of USP ceramics of compn. $\text{Li}_3\text{Sc}_2\text{-xFex}(\text{PO}_4)_3$ ($0 < x \leq 0.6$) was stabilized at room temp., which may be caused by slight structural distortions and changes in the interactions between the lithium ions during Sc^{3+} to Fe^{3+} substitution. The highest ionic cond. .sigma. (25.degree.C) .apprx. 1.times.10⁻⁵ S/cm was obsd. for ceramics with $x=0.4$.

IT 141051-47-0P, Iron lithium scandium phosphate
 $\text{Fe}_{0.2}\text{Li}_3\text{Sc}_{1.8}(\text{PO}_4)_3$ 155694-16-9P, Iron lithium scandium phosphate
 $\text{Fe}_{0.4}\text{Li}_3\text{Sc}_{1.6}(\text{PO}_4)_3$ 155694-17-0P, Iron lithium scandium phosphate
 $\text{Fe}_{0.6}\text{Li}_3\text{Sc}_{1.4}(\text{PO}_4)_3$ 371758-79-1P, Iron lithium scandium phosphate
 $(\text{Fe}_{0.1}\text{Li}_3\text{Sc}_{1.9}(\text{PO}_4)_3)$ 371758-80-4P, Iron lithium scandium phosphate
 $(\text{Fe}_{0.3}\text{Li}_3\text{Sc}_{1.7}(\text{PO}_4)_3)$
 (powders and films; ultrasonic spray pyrolysis prepn. and properties of $\text{Li}_3\text{Sc}_2\text{-xFex}(\text{PO}_4)_3$ thin films and powders)

RN 141051-47-0 HCA
 CN Iron lithium scandium phosphate ($\text{Fe}_{0.2}\text{Li}_3\text{Sc}_{1.8}(\text{PO}_4)_3$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Sc	1.8	7440-20-2
Li	3	7439-93-2
Fe	0.2	7439-89-6

RN 155694-16-9 HCA
 CN Iron lithium scandium phosphate ($\text{Fe}_{0.4}\text{Li}_3\text{Sc}_{1.6}(\text{PO}_4)_3$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Sc	1.6	7440-20-2
Li	3	7439-93-2
Fe	0.4	7439-89-6

RN 155694-17-0 HCA
 CN Iron lithium scandium phosphate ($\text{Fe}_{0.6}\text{Li}_3\text{Sc}_{1.4}(\text{PO}_4)_3$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Sc	1.4	7440-20-2
Li	3	7439-93-2
Fe	0.6	7439-89-6

RN 371758-79-1 HCA

CN Iron lithium scandium phosphate (Fe_{0.1}Li₃Sc_{1.9}(PO₄)₃) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Sc	1.9	7440-20-2
Li	3	7439-93-2
Fe	0.1	7439-89-6

RN 371758-80-4 HCA

CN Iron lithium scandium phosphate (Fe_{0.3}Li₃Sc_{1.7}(PO₄)₃) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Sc	1.7	7440-20-2
Li	3	7439-93-2
Fe	0.3	7439-89-6

CC 57-2 (Ceramics)

Section cross-reference(s): 52, 76

IT Solid **electrolytes**(iron lithium scandium phosphate powders and films; ultrasonic spray pyrolysis prepn. and properties of Li₃Sc₂-xFex(PO₄)₃ thin films and powders)IT 36058-25-0P, Iron lithium phosphate Fe₂Li₃(PO₄)₃ 87796-15-4P,Lithium scandium phosphate Li₃Sc₂(PO₄)₃ **141051-47-0P**, Ironlithium scandium phosphate Fe_{0.2}Li₃Sc_{1.8}(PO₄)₃ **155694-16-9P**, Iron lithium scandium phosphate Fe_{0.4}Li₃Sc_{1.6}(PO₄)₃**155694-17-0P**, Iron lithium scandium phosphateFe_{0.6}Li₃Sc_{1.4}(PO₄)₃ **371758-79-1P**, Iron lithium scandiumphosphate (Fe_{0.1}Li₃Sc_{1.9}(PO₄)₃) **371758-80-4P**, Iron lithiumscandium phosphate (Fe_{0.3}Li₃Sc_{1.7}(PO₄)₃) 371758-81-5P(powders and films; ultrasonic spray pyrolysis prepn. and properties of Li₃Sc₂-xFex(PO₄)₃ thin films and powders)

L22 ANSWER 8 OF 10 HCA COPYRIGHT 2002 ACS

135:346864 Cathode for **nonaqueous****electrolyte** lithium ion **battery**. Yamada, Atsuo;

Yamahira, Takayuki (Sony Corporation, Japan). Eur. Pat. Appl. EP 1150368 A2 20011031, 26 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-109919 20010424. PRIORITY: JP 2000-128998 20000425..

AB The lithium ion cell is improved appreciably in operational stability under special conditions, such as high temps., and exhibits superior characteristics against over-discharging, while guaranteeing compatibility to the operating voltage of a conventional lithium ion cell and an energy d. equiv. to that of the conventional lithium ion cell. To this end, the lithium ion cell includes a pos. **electrode**, a neg. **electrode** and a **nonaq. electrolyte**, and uses, as a pos. **electrode** active material, a composite material of a first lithium compd. represented by the general formula $\text{Li}_x\text{M}_y\text{PO}_4$, where $0 < x < 2$, $0.8 < y < 1.2$ and M contains Fe, and a second lithium compd. having a potential holder than the potential of the first lithium compd.

IT 19414-36-9, Iron lithium manganese phosphate ((Fe,Mn)Li(PO₄))
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

RN 19414-36-9 HCA

CN Iron lithium manganese phosphate ((Fe,Mn)Li(PO₄)) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	1	14265-44-2
Mn	0 - 1	7439-96-5
Li	1	7439-93-2
Fe	0 - 1	7439-89-6

IC ICM H01M004-58
ICS C01G049-00; C01B025-30; C01B025-45; H01M004-38

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **nonaq electrolyte cathode**

IT Charcoal
(activated; **cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT **Battery cathodes**
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Carbon fibers, uses
Carbonaceous materials (technological products)
Coke
Petroleum coke
(**cathode** for **nonaq. electrolyte** lithium ion **battery**)

IT Carbon black, uses

- (cathode for nonaq. electrolyte lithium ion battery)
- IT Fluoropolymers, uses
(cathode for nonaq. electrolyte lithium ion battery)
- IT Organic compounds, uses
(high mol., sintered; cathode for nonaq. electrolyte lithium ion battery)
- IT Secondary batteries
(lithium; cathode for nonaq. electrolyte lithium ion battery)
- IT Coke
(needle; cathode for nonaq. electrolyte lithium ion battery)
- IT Coke
(pitch; cathode for nonaq. electrolyte lithium ion battery)
- IT Furan resins
Phenolic resins, uses
(sintered and carbonized; cathode for nonaq. electrolyte lithium ion battery)
- IT 50-21-5D, Lactic acid, ester 60-29-7, Diethyl ether, uses
64-19-7D, Acetic acid, ester, uses 75-05-8, Acetonitrile, uses
79-09-4D, Propionic acid, ester 96-47-9, 2-Methyltetrahydrofuran
96-48-0 96-49-1, Ethylene carbonate 100-66-3, Anisole, uses
105-58-8, Diethyl carbonate 107-12-0, Propionitrile 108-32-7,
Propylene carbonate 109-99-9, Thf, uses 110-71-4,
1,2-Dimethoxyethane 126-33-0, Sulfolane 409-21-2, Silicon
carbide sic, uses 554-12-1, Methyl propionate 616-38-6, Dimethyl
carbonate 623-42-7, Methyl butyrate 623-96-1, Dipropyl carbonate
629-14-1, 1,2-Diethoxyethane 646-06-0, 1,3-Dioxolane 872-36-6,
Vinylene carbonate 1072-47-5, 4-Methyl-1,3-dioxolane 1313-08-2
2550-62-1, Lithium methanesulfonate 4437-85-8, Butylene carbonate
7439-93-2, Lithium, uses 7440-50-8, Copper, uses 7447-41-8,
Lithium chloride, uses 7550-35-8, Lithium bromide 7782-42-5,
Graphite, uses 7791-03-9, Lithium perchlorate 9003-07-0,
Polypropylene 12007-81-7, Silicon tetraboride 12008-29-6,
Silicon hexaboride 12013-56-8, Calcium disilicide 12017-12-8,
Cobalt disilicide 12018-09-6, Chromium disilicide 12022-99-0,
Iron disilicide 12032-86-9, Manganese disilicide 12033-76-0,
Silicon nitride oxide Si₂N₂O 12033-89-5, Silicon nitride, uses
12034-80-9, Niobium disilicide 12039-79-1, Tantalum disilicide
12039-83-7, Titanium silicide TiSi₂ 12039-87-1, Vanadium
disilicide 12039-88-2, Tungsten disilicide 12059-14-2, Nickel
silicide (Ni₂Si) 12136-78-6, Molybdenum disilicide 12159-07-8,
Copper silicide Cu₅Si 12190-79-3, Cobalt lithium oxide CoLiO₂
12201-89-7, Nickel disilicide 14283-07-9, Lithium
tetrafluoroborate 14485-20-2, Lithium tetraphenylborate
15365-14-7, Iron lithium phosphate FeLiPO₄ 19414-36-9,
Iron lithium manganese phosphate ((Fe,Mn)Li(PO₄)) 21324-40-3,

- Lithium hexafluorophosphate 22831-39-6, Magnesium silicide (Mg_2Si) 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium trifluoromethanesulfonate 35678-71-8, Methylsulfolane 90076-65-6 113066-89-0, Cobalt lithium nickel oxide $\text{Co}_0.2\text{LiNi}_0.8\text{O}_2$ 113671-38-8, Silicon oxide SiO_2 160479-36-7, Lithium tin oxide 178958-56-0, Lithium silicon oxide 300858-61-1 339333-78-7, Zinc silicide ZnSi_2 371148-86-6, Tin oxide (SnO_2) 371148-87-7, Lithium magnesium manganese oxide ($\text{LiMg}_0.2\text{Mn}_0.8\text{O}_2$)
 (cathode for nonaq. electrolyte lithium ion battery)
 IT 24937-79-9, PvdF
 (cathode for nonaq. electrolyte lithium ion battery)
 IT 7440-44-0, Carbon, uses
 (pyrocarbon; cathode for nonaq. electrolyte lithium ion battery)
- L22 ANSWER 9 OF 10 HCA COPYRIGHT 2002 ACS
 135:79439 Manufacture of spinel type lithium manganate and cathode active mass for secondary **nonaqueous electrolyte batteries**. Numata, Koichi; Kamata, Tsuneyoshi (Mitsui Mining and Smelting Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2001180939 A2 20010703, 30 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-367557 19991224.
- AB Spinel type Li manganate is prepd. by mixing **electrolytic** MnO_2 and/or MnCO_3 contg. .gtoreq.150 ppm Mg with a Li source and an amt. of source compd. of Mg, Al, Fe, Cu, Zn, Ca, Si, P, Ti, Cr, Na, K, V, and/or B sufficient to replace 0.05-12.5 mol.% of Mn and **sintering** the mixt. The Li manganate is used as cathode active mass in secondary Li **batteries**.
- IT **347384-56-9P**, Lithium manganese oxide phosphate ($\text{LiMn}_1.9\text{O}_3.6(\text{PO}_4)0.1$) **347384-57-0P**, Lithium manganese oxide phosphate ($\text{LiMn}_1.8\text{O}_3.2(\text{PO}_4)0.2$)
 (comps. and manuf. of magnesium contg. substituted spinel type lithium manganate for secondary lithium **battery cathodes**)
- RN 347384-56-9 HCA
 CN Lithium manganese oxide phosphate ($\text{LiMn}_1.9\text{O}_3.6(\text{PO}_4)0.1$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.6	17778-80-2
O4P	0.1	14265-44-2
Mn	1.9	7439-96-5
Li	1	7439-93-2

- RN 347384-57-0 HCA
 CN Lithium manganese oxide phosphate ($\text{LiMn}_1.8\text{O}_3.2(\text{PO}_4)0.2$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	3.2	17778-80-2
O4P	0.2	14265-44-2
Mn	1.8	7439-96-5
Li	1	7439-93-2

IC ICM C01G045-12

ICS H01M004-02; H01M004-58; H01M010-40

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **battery cathode** substituted lithium manganate manuf

IT **Battery cathodes**

(compsn. and manuf. of magnesium contg. substituted spinel type lithium manganate for secondary lithium **battery cathodes**)

IT 12057-17-9P, Lithium manganese oxide (LiMn2O4) 130260-87-6P,
Chromium lithium manganese oxide (Cr0.1LiMn1.9O4) 130732-38-6P,
Iron lithium manganese oxide (Fe0.2LiMn1.8O4) 130811-80-2P,
Lithium manganese nickel oxide (LiMn1.8Ni0.2O4) 136479-29-3P,
Calcium lithium manganese oxide (Ca0.1LiMn1.9O4) 136479-30-6P,
Lithium manganese zinc oxide (LiMn1.9Zn0.1O4) 136479-37-3P,
Lithium magnesium manganese oxide (LiMg0.2Mn1.8O4) 136479-43-1P,
Lithium magnesium manganese oxide (LiMg0.1Mn1.9O4) 143599-23-9P,
Lithium manganese zinc oxide (LiMn1.8Zn0.2O4) 145423-77-4P,
Lithium manganese borate oxide (LiMn1.9(BO3)0.1O3.7) 145896-59-9P,
Aluminum lithium manganese oxide (Al0.1LiMn1.9O4) 146956-26-5P,
Cobalt lithium manganese oxide (Co0.1LiMn1.9O4) 147787-62-0P,
Lithium manganese nickel oxide (LiMn1.9Ni0.1O4) 147812-19-9P, Iron
lithium manganese oxide (Fe0.1LiMn1.9O4) 152013-71-3P, Lithium
manganese titanium oxide (LiMn1.8Ti0.2O4) 171827-58-0P, Aluminum
lithium manganese oxide (Al0.25LiMn1.75O4) 171827-60-4P, Cobalt
lithium manganese oxide (Co0.25LiMn1.75O4) 177988-73-7P, Lithium
manganese titanium oxide (LiMn1.9Ti0.1O4) 182866-80-4P, Lithium
manganese vanadium oxide (LiMn1.9V0.1O4) 188592-69-0P, Cobalt
lithium manganese oxide (Co0.01LiMn1.99O4) 191025-26-0P, Lithium
manganese oxide silicate (LiMn1.8O3.2(SiO4)0.2) 191025-29-3P,
Calcium lithium manganese oxide (Ca0.2LiMn1.8O4) 191025-31-7P,
Copper lithium manganese oxide (Cu0.2LiMn1.8O4) 192754-58-8P,
Lithium manganese nickel oxide (LiMn1.99Ni0.01O4) 192754-63-5P,
Chromium lithium manganese oxide (Cr0.01LiMn1.99O4) 198195-81-2P,
Lithium manganese borate oxide (LiMn1.98(BO3)0.02O3.94)
198830-10-3P, Chromium lithium manganese oxide (Cr0.25LiMn1.75O4)
201857-54-7P, Copper lithium manganese oxide (Cu0.1LiMn1.9O4)
209470-15-5P, Aluminum lithium manganese oxide (Al0.01LiMn1.99O4)
209470-17-7P, Iron lithium manganese oxide (Fe0.01LiMn1.99O4)
220480-69-3P, Lithium manganese oxide silicate
(LiMn1.9O3.6(SiO4)0.1) 347384-54-7P, Lithium magnesium manganese
oxide (LiMg0.01Mn1.99O4) **347384-56-9P**, Lithium manganese
oxide phosphate (LiMn1.9O3.6(PO4)0.1) **347384-57-0P**,

- Lithium manganese oxide phosphate ($\text{LiMn}_{1.8}\text{O}_{3.2}(\text{PO}_4)_0.2$)
 347384-58-1P, Lithium manganese sodium oxide ($\text{LiMn}_{1.98}\text{Na}_{0.02}\text{O}_4$)
 347384-59-2P, Lithium manganese sodium oxide ($\text{LiMn}_{1.9}\text{Na}_{0.1}\text{O}_4$)
 347384-60-5P, Lithium manganese potassium oxide ($\text{LiMn}_{1.98}\text{K}_{0.02}\text{O}_4$)
 347384-61-6P, Lithium manganese potassium oxide ($\text{LiMn}_{1.9}\text{K}_{0.1}\text{O}_4$)
 347384-62-7P, Lithium manganese vanadium oxide ($\text{LiMn}_{1.99}\text{V}_{0.01}\text{O}_4$)
 347384-63-8P, Lithium manganese vanadium oxide ($\text{LiMn}_{1.75}\text{V}_{0.25}\text{O}_4$)
 (compos. and manuf. of magnesium contg. substituted spinel type
 lithium manganate for secondary lithium **battery**
cathodes)
- IT 7439-95-4, Magnesium, uses
 (magnesium contg. manganese sources in manuf. of lithium
 manganate for secondary lithium **battery**
cathodes)
- IT 598-62-9, Manganese carbonate 1313-13-9, Manganese dioxide,
 processes
 (magnesium contg. manganese sources in manuf. of lithium
 manganate for secondary lithium **battery**
cathodes)
- L22 ANSWER 10 OF 10 HCA COPYRIGHT 2002 ACS
 114:176333 Solid **electrolyte** and its preparation. Yamamura,
 Koji; Takada, Kazunori; Taniguchi, Noboru; Kondo, Shigeo (Matsushita
 Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP
 02225310 A2 19900907 Heisei, 5 pp. (Japanese). CODEN: JKXXAF.
 APPLICATION: JP 1989-43759 19890223.
- AB A Li ion conductive solid **electrolyte** is
 $\text{Li}_{1+x}\text{M}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ ($\text{M} = \text{B}, \text{Al}, \text{Ga}, \text{In}, \text{Tl}, \text{Sc}, \text{Y}, \text{La}, \text{Ce}, \text{Pr}$) and
 optionally a metal oxide is added to the phosphate and its prepn.
 involves making the phosphate amorphous and **annealing** the
 resulting phosphate. The solid **electrolyte** is prepd. by
 adding H_3PO_4 to ethanol contg. salts of Li, Ti, and M, neutralizing
 the soln. by alkali to give a mainly Li_3PO_4 and $\text{Ti}_3(\text{PO}_4)_4$ mixt., and
 sintering the mixt. The **electrolyte** is useful for solid
electrolyte batteries, elec. double layer
 capacitors, electrochromic display, etc. The ion cond. of the
 phosphate compd. depends on its grain size and grain size
 uniformity.
- IT 120479-61-0, Aluminum lithium titanium phosphate
 $[\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3]$ 127689-78-5, Lanthanum lithium
 titanium phosphate $[\text{La}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3]$ 127887-18-7,
 Lithium scandium titanium phosphate $[\text{Li}_{1.3}\text{Sc}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3]$
 131313-56-9, Lithium titanium yttrium phosphate
 $(\text{Li}_{1.3}\text{Ti}_{1.7}\text{Y}_{0.3}(\text{PO}_4)_3)$ 131313-74-1, Gallium lithium
 titanium phosphate $(\text{Ga}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$ 131313-76-3,
 Indium lithium titanium phosphate $(\text{In}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$
 133138-74-6, Cerium lithium titanium phosphate
 $(\text{Ce}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$ 133174-38-6, Lithium thallium
 titanium phosphate $(\text{Li}_{1.3}\text{Tl}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$ 133174-39-7,
 Lithium praseodymium titanium phosphate $(\text{Li}_{1.3}\text{Pr}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$
 (solid **electrolyte** of, lithium ion conductive, for
battery and capacitor and display device)

RN 120479-61-0 HCA

CN Aluminum lithium titanium phosphate ($\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

RN 127689-78-5 HCA

CN Lanthanum lithium titanium phosphate ($\text{La}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
La	0.3	7439-91-0

RN 127887-18-7 HCA

CN Lithium scandium titanium phosphate ($\text{Li}_{1.3}\text{Sc}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

RN 131313-56-9 HCA

CN Lithium titanium yttrium phosphate ($\text{Li}_{1.3}\text{Ti}_{1.7}\text{Y}_{0.3}(\text{PO}_4)_3$) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Y	0.3	7440-65-5
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 131313-74-1 HCA

CN Gallium lithium titanium phosphate ($\text{Ga}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ga	0.3	7440-55-3
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 131313-76-3 HCA

CN Indium lithium titanium phosphate (In_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
In	0.3	7440-74-6
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 133138-74-6 HCA

CN Cerium lithium titanium phosphate (Ce_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ce	0.3	7440-45-1
Ti	1.7	7440-32-6
Li	1.3	7439-93-2

RN 133174-38-6 HCA

CN Lithium thallium titanium phosphate (Li_{1.3}Tl_{0.3}Ti_{1.7}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Tl	0.3	7440-28-0
Li	1.3	7439-93-2

RN 133174-39-7 HCA

CN Lithium praseodymium titanium phosphate (Li_{1.3}Pr_{0.3}Ti_{1.7}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2

Ti	1.7	7440-32-6
Pr	0.3	7440-10-0
Li	1.3	7439-93-2

IC ICM C01B025-45
ICS C01B035-14; H01B001-06; H01M006-18; H01M010-36

CC 76-2 (Electric Phenomena)
Section cross-reference(s): 52, 74

ST lithium titanium phosphate ion conductive; **battery**
capacitor display solid **electrolyte**

IT **Batteries**, primary
(lithium ion conductive solid **electrolyte** for,
phosphate compds. as)

IT Electric capacitors
(double-layer, lithium ion conductive solid **electrolyte**
for, phosphate compds. as)

IT Optical imaging devices
(electrochromic, lithium ion conductive solid **electrolyte**
for, phosphate compds. as)

IT 120479-61-0, Aluminum lithium titanium phosphate
[Al_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃] 127689-78-5, Lanthanum lithium
titanium phosphate [La_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃] 127887-18-7,
Lithium scandium titanium phosphate [Li_{1.3}Sc_{0.3}Ti_{1.7}(PO₄)₃]
131313-56-9, Lithium titanium yttrium phosphate
(Li_{1.3}Ti_{1.7}Y_{0.3}(PO₄)₃) 131313-74-1, Gallium lithium
titanium phosphate (Ga_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃) 131313-76-3,
Indium lithium titanium phosphate (In_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃)
133138-74-6, Cerium lithium titanium phosphate
(Ce_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃) 133139-17-0 133174-38-6, Lithium
thallium titanium phosphate (Li_{1.3}Tl_{0.3}Ti_{1.7}(PO₄)₃)
133174-39-7, Lithium praseodymium titanium phosphate
(Li_{1.3}Pr_{0.3}Ti_{1.7}(PO₄)₃)
(solid **electrolyte** of, lithium ion conductive, for
battery and capacitor and display device)

=> d 123 1-4 cbib abs hitstr hitind

L23 ANSWER 1 OF 4 HCA COPYRIGHT 2002 ACS

135:35187 **Batteries** comprising solid **electrolytes**
sandwiched in between spinel-type lithium manganate **cathodes**
and spinel-type lithium titanate **anodes**. Hara, Toru;
Kitahara, Nobuyuki; Uemura, Toshihiko; Mishima, Hiromitsu; Magome,
Shinji; Osaki, Makoto; Higuchi, Hisashi (Kyocera Corp., Japan).
Jpn. Kokai Tokkyo Koho JP 2001155763 A2 20010608, 5 pp. (Japanese).
CODEN: JKXXAF. APPLICATION: JP 1999-336715 19991126.

AB The **batteries** comprise solid **electrolytes** of (A)
sintered materials of Li₂MnO₃ and Li_{1+x+y}M_xTi_{2-x}Si_yP_{3-y}O₁₂
(I; M = Al or Ga; x = 0-0.4; 0 < y .ltoreq. 0.6) on the
cathode side and (B) **sintered** materials of Li₂TiO₃
and I on the **anode** side, sandwiched in between the
electrodes and placed in an outer package. Such

batteries with cathodes consisting of $\text{Li}_{1+x}\text{Mn}_{2-x}\text{O}_4$ ($x = 0.05-0.2$) or $\text{Li}_{1+x}\text{Ni}_y\text{Mn}_{2-x-y}\text{O}_4$ ($x = 0-0.2$; $0.4 \leq y < 0.6$) and anodes consisting of $\text{Li}_{1+x}\text{Ti}_2\text{O}_4$ ($x = 0.25-0.40$) are also claimed. Batteries with low surface resistance between the electrodes and the electrolytes are obtained. The batteries are suitable for use in personal digital assistance.

IT 343950-37-8 343950-39-0 343950-42-5

(electrolyte; batteries comprising lithium titanium phosphate silicate electrolytes showing low surface resistances with lithium spinel oxide electrodes for use in personal digital assistances)

RN 343950-37-8 HCA

CN Aluminum lithium manganese titanium oxide phosphate silicate ($\text{Al}_{0.22}\text{Li}_{1.5}\text{Mn}_{0.27}\text{Ti}_{1.24}\text{O}_{0.54}(\text{PO}_4)_{2.19}(\text{SiO}_4)_{0.07}$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.54	17778-80-2
O ₄ Si	0.07	17181-37-2
O ₄ P	2.19	14265-44-2
Ti	1.24	7440-32-6
Mn	0.27	7439-96-5
Li	1.5	7439-93-2
Al	0.22	7429-90-5

RN 343950-39-0 HCA

CN Aluminum lithium titanium phosphate silicate ($\text{Al}_{0-0.4}\text{Li}_{1-2}\text{Ti}_{1.4-2}(\text{PO}_4)_{2.4-3}(\text{SiO}_4)_{0-0.6}$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O ₄ Si	0 - 0.6	17181-37-2
O ₄ P	2.4 - 3	14265-44-2
Ti	1.4 - 2	7440-32-6
Li	1 - 2	7439-93-2
Al	0 - 0.4	7429-90-5

RN 343950-42-5 HCA

CN Gallium lithium titanium phosphate silicate ($\text{Ga}_{0-0.4}\text{Li}_{1-2}\text{Ti}_{1.4-2}(\text{PO}_4)_{2.4-3}(\text{SiO}_4)_{0-0.6}$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O ₄ Si	0 - 0.6	17181-37-2
O ₄ P	2.4 - 3	14265-44-2
Ga	0 - 0.4	7440-55-3
Ti	1.4 - 2	7440-32-6

Li		1 - 2		7439-93-2
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IC ICM H01M010-36
 ICS H01M004-02; H01M004-58
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 57
 ST lithium titanium phosphate silicate **battery electrolyte**; spinel lithium oxide **electrode battery electrolyte**; personal digital assistance solid **electrolyte battery**
 IT **Battery anodes**
 Battery cathodes
 Battery electrolytes
 Solid state secondary **batteries**
 (**batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
 IT 123921-35-7, Lithium titanium oxide (Li_{1.33}Ti_{1.67}O₄) 343950-34-5,
 Lithium titanium oxide (Li_{1.25}-1.4Ti_{1.6}-1.75O₄)
 (**anode; batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
 IT 343950-44-7
 (**cathode-side electrolyte; batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
 IT 155472-68-7, Lithium manganese oxide (Li_{1.1}Mn_{1.9}O₄) 335638-14-7,
 Lithium manganese oxide (Li_{1.05}-1.2Mn_{1.8}-1.95O₄) 343950-32-3,
 Lithium manganese nickel oxide (Li₁-1.2Mn_{0.4}-0.6Ni_{0.2}-0.6O₄)
 (**cathode; batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
 IT 12031-82-2, Lithium titanium oxide (Li₂TiO₃)
 (**electrolyte on anode side contg.; batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
 IT 12163-00-7, Lithium manganese oxide (Li₂MnO₃)
 (**electrolyte on cathode side contg.; batteries** comprising lithium titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)
 IT 343950-37-8 343950-39-0 343950-42-5
 (**electrolyte; batteries** comprising lithium

titanium phosphate silicate **electrolytes** showing low surface resistances with lithium spinel oxide **electrodes** for use in personal digital assistances)

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132:67892 Comparative study of lithium ion conductors in the system $\text{Li}_{1+x}\text{Al}_x\text{A}_{2-x}\text{IV}(\text{PO}_4)_3$ with AIV = Ti or Ge and 0.1 to 0.7 for use as Li^+ sensitive membranes. Cretin, M.; Fabry, P. (Laboratoire d'Electrochimie et de Physico-chimie des Materiaux et des Interfaces, ENSEEG, Associe CNRS(UMR 5631) et Universite J. Fourier (Grenoble 1), Saint Martin d'Heres, 38402, Fr.). Journal of the European Ceramic Society, 19(16), 2931-2940 (English) 1999. CODEN: JECSEB. ISSN: 0955-2219. Publisher: Elsevier Science Ltd..

AB Preps. and physico-chem. characterizations of NASICON-type compds. in the system $\text{Li}_{1+x}\text{Al}_x\text{A}_{2-x}\text{IV}(\text{PO}_4)_3$ (AIV = Ti or Ge) are described. Ceramics have been fabricated by sol-gel and cogrinding processes for use as ionosensitive membrane for Li^+ selective **electrodes**. The structural and elec. characteristics of the pellets have been examd. Solid solns. are obtained with Al/Ti and Al/Ge substitutions in the range 0.1 to 0.6. A min. of the rhombohedral c parameter appears for x about 0.1 for both solns. The grain ionic cond. has been characterized only in the case of Ge-based compds. It is related to the carrier concn. and the structural properties of the NASICON covalent skeleton. The results confirm that the Ti-based framework is more calibrated to Li^+ migration than the Ge-based one. A grain cond. of $10^{-3} \text{ S cm}^{-1}$ is obtained at 25.degree.C in the case of $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$. A total cond. of about $6 \times 10^{-5} \text{ S cm}^{-1}$ is measured on **sintered** pellets because of grain boundary effects. The use of such ceramics in ISE devices has shown that the most confined unit cell (i.e., in Ge-based materials) is more appropriate for selectivity effect, although it is less conductive.

IT 120479-61-0P, Aluminum lithium titanium phosphate $\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$ 163119-09-3P, Aluminum lithium titanium phosphate $\text{Al}_{0.6}\text{Li}_{1.6}\text{Ti}_{1.4}(\text{PO}_4)_3$ 214119-31-0P, Aluminum lithium titanium phosphate $\text{Al}_{0.1}\text{Li}_{1.1}\text{Ti}_{1.9}(\text{PO}_4)_3$ 253129-60-1P, Aluminum lithium titanium phosphate $(\text{Al}_{0.7}\text{Li}_{1.7}\text{Ti}_{1.3}(\text{PO}_4)_3)$

(Li ion conductor; sol-gel prepn. and properties of NASICON-type Al Li Ti phosphate and Al Ge Li phosphate lithium ion conductors for use as Li^+ sensitive membranes)

RN 120479-61-0 HCA

CN Aluminum lithium titanium phosphate $(\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$ (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

RN 163119-09-3 HCA
 CN Aluminum lithium titanium phosphate (Al_{0.6}Li_{1.6}Ti_{1.4}(PO₄)₃) (9CI)
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.4	7440-32-6
Li	1.6	7439-93-2
Al	0.6	7429-90-5

RN 214119-31-0 HCA
 CN Aluminum lithium titanium phosphate (Al_{0.1}Li_{1.1}Ti_{1.9}(PO₄)₃) (9CI)
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Li	1.1	7439-93-2
Al	0.1	7429-90-5

RN 253129-60-1 HCA
 CN Aluminum lithium titanium phosphate (Al_{0.7}Li_{1.7}Ti_{1.3}(PO₄)₃) (9CI)
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.3	7440-32-6
Li	1.7	7439-93-2
Al	0.7	7429-90-5

CC 57-2 (Ceramics)

Section cross-reference(s): 76

IT 30622-39-0P, Lithium titanium phosphate LiTi₂(PO₄)₃ 78538-41-7P,
 Germanium Lithium phosphate Ge₂Li(PO₄)₃ 108431-08-9P, Aluminum
 germanium lithium phosphate Al_{0.5}Ge_{1.5}Li_{1.5}(PO₄)₃ 119356-70-6P,
 Aluminum germanium lithium phosphate Al_{0.1}Ge_{1.9}Li_{1.1}(PO₄)₃
 119356-72-8P, Aluminum germanium lithium phosphate
 Al_{0.3}Ge_{1.7}Li_{1.3}(PO₄)₃ 119356-74-0P, Aluminum germanium lithium
 phosphate Al_{0.6}Ge_{1.4}Li_{1.6}(PO₄)₃ 120479-61-0P, Aluminum
 lithium titanium phosphate Al_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃ 131266-83-6P,
 Aluminum lithium titanium phosphate Al_{0.5}Li_{1.5}Ti_{1.5}(PO₄)₃
 144048-59-9P, Aluminum germanium lithium phosphate
 Al_{0.7}Ge_{1.3}Li_{1.7}(PO₄)₃ 163119-09-3P, Aluminum lithium
 titanium phosphate Al_{0.6}Li_{1.6}Ti_{1.4}(PO₄)₃ 214119-31-0P,
 Aluminum lithium titanium phosphate Al_{0.1}Li_{1.1}Ti_{1.9}(PO₄)₃

253129-60-1P, Aluminum lithium titanium phosphate
($\text{Al}_{0.7}\text{Li}_{1.7}\text{Ti}_{1.3}(\text{PO}_4)_3$)

(Li ion conductor; sol-gel prepn. and properties of NASICON-type
Al Li Ti phosphate and Al Ge Li phosphate lithium ion conductors
for use as Li^+ sensitive membranes)

L23 ANSWER 3 OF 4 HCA COPYRIGHT 2002 ACS

130:184798 A first approach to a monolithic all solid state inorganic
lithium **battery**. Birke, P.; Salam, F.; Doring, S.;
Weppner, W. (Technical Faculty, Sensors and Solid State Ionics,
Christian Albrechts University, Kiel, D-24143, Germany). Solid
State Ionics, 118(1,2), 149-157 (English) 1999. CODEN: SSIOD3.
ISSN: 0167-2738. Publisher: Elsevier Science B.V..

AB We investigated the feasibility of a monolithic, fully inorg. solid
state lithium **battery**. The main requirements for such an
inorg. **battery** are a ceramic lithium **electrolyte**
with high ionic cond. and a large stability window, and a second ion
conductor which acts as **sintering** additive within the
whole **battery** to prevent high prepn. temps. which may
cause undesired thermodyn. reactions between the **electrodes**
and the **electrolyte** prior to the first charge of the
battery. This **sintering** additive must at no time
react with the pos. lithium transition metal oxide **electrode**
where the oxidn. state of the transition metal may easily change.
For these reasons, the reproducibility of the high reported ionic
cond. of $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$ and the lithium-rich and lithium-poor
stability limits have been investigated. For **sintering**
additive $0.44 \text{ LiBO}_2 \cdot 0.56 \text{ LiF}$ has been tested. First cycling
results on the system $\text{Li}_4\text{Ti}_5\text{O}_{12} | \text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3 | \text{LiMn}_2\text{O}_4$ are
presented.

IT **120479-61-0**, Aluminum lithium titanium phosphate
 $\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$

(monolithic all solid state inorg. lithium **battery**)

RN 120479-61-0 HCA

CN Aluminum lithium titanium phosphate ($\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

CC **52-2** (Electrochemical, Radiational, and Thermal Energy
Technology)

Section cross-reference(s): 57

ST lithium **battery** all solid state inorg

IT Glass, uses

(lithium borate fluoride, **sintering** additive;
monolithic all solid state inorg. lithium **battery**)

- IT Primary **batteries**
(lithium; monolithic all solid state inorg. lithium **battery**)
- IT Ionic conductivity
Sintering aids
(monolithic all solid state inorg. lithium **battery**)
- IT 7789-24-4, Lithium fluoride, uses 13453-69-5, Lithium borate libo2
(glass, **sintering** additive; monolithic all solid state inorg. lithium **battery**)
- IT 12031-95-7, Lithium titanium oxide $\text{Li}_4\text{Ti}_5\text{O}_{12}$ 12057-17-9, Lithium manganese oxide LiMn_2O_4 **120479-61-0**, Aluminum lithium titanium phosphate $\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$
(monolithic all solid state inorg. lithium **battery**)
- L23 ANSWER 4 OF 4 HCA COPYRIGHT 2002 ACS
- 124:35522 Study of $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ for Li^+ potentiometric sensors. Cretin, M.; Fabry, P.; Abello, L. (Lab. Ionique Electrochim. Solide Grenoble, CNRS URA, Saint Martin d'Heres, 38402, Fr.). Journal of the European Ceramic Society, 15(11), 1149-56 (English) 1995. CODEN: JECSEB. ISSN: 0955-2219. Publisher: Elsevier.
- AB Mineral compds. $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ ($x = 0$ and $x = 0.3$) have been made by co-grinding and sol-gel processes. Structural characterizations by x-ray diffraction and Raman spectroscopy indicate that alumina substitution ($x = 0.3$) does not modify the crystallog. structure, whatever the synthesis process: compds. crystallize in the rhombohedral system with an R-3C space group. The use of the sol-gel route makes low-temp. **sintering** (950.degree.C) easier and, moreover, leads to ceramics with a high water stability. $\text{Li}_{1.3}\text{Al}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$ compds. are fast ionic conductors: $\sigma_{25^\circ\text{C}}$ varies from 10^{-5} to 10^{-4} S cm^{-1} , depending on the synthesis process. They have been used as ionic membranes for lithium-selective **electrodes**. Sensors prepd. with sol-gel membranes have the best performance: the detection limit is 1.4×10^{-4} mol dm^{-3} . The potassium and the protonic selectivity properties are attractive for such **electrodes**. For sodium, they need to be improved for biomedical applications.
- IT **120479-61-0**, Aluminum lithium titanium phosphate $\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$
(sensors, potentiometric; low-temp. processing and properties of $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ potentiometric sensors for Li^+)
- RN 120479-61-0 HCA
- CN Aluminum lithium titanium phosphate ($\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

CC 57-2 (Ceramics)
 Section cross-reference(s): 47, 76
 IT **Electrodes**
 (lithium-selective, low-temp. processing and properties of
 $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ potentiometric sensors for Li^+)
 IT 30622-39-0, Lithium titanium phosphate $\text{LiTi}_2(\text{PO}_4)_3$
 120479-61-0, Aluminum lithium titanium phosphate
 $\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$
 (sensors, potentiometric; low-temp. processing and properties of
 $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ potentiometric sensors for Li^+)

=> d l24 1-10 cbib abs hitstr hitind

L24 ANSWER 1 OF 10 HCA COPYRIGHT 2002 ACS
 135:365256 Non-sintered lithium ion-conductive solid
electrolytes. Takada, Kazunori; Kondo, Shigeo; Watanabe,
 Jun; Inada, Taro; Kajiyama, Akihisa; Kouguchi, Masaru (National
 Institute for Research in Inorganic Materials, Japan; Toda Kogyo
 Corp.; Japan Storage Battery Co., Ltd.; Denki Kagaku Kogyo Co.,
 Ltd.). Jpn. Kokai Tokkyo Koho JP 2001319520 A2 20011116, 6 pp.
 (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-134106 20000508.
 AB The **electrolytes**, useful for **batteries**, are
 manufd. by mixing Li ion-conductive amorphous solid
electrolytes and phosphate salts contg. Li and Ti. The
 phosphate salts may be $\text{Li}_{1+x}\text{Ti}_{2-x}\text{M}_x(\text{PO}_4)_3$ (M = ions of Al, Cr, Ga,
 Fe, Sc, In, Y, La; x = 0-0.5) and the amorphous **electrolytes**
 may be sulfides.
 IT 120479-61-0P, Aluminum lithium titanium phosphate
 $(\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$
 (non-sintered Li-conductive solid **electrolytes**
 for **batteries**)
 RN 120479-61-0 HCA
 CN Aluminum lithium titanium phosphate $(\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3)$ (9CI)
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

IC ICM H01B001-06
 ICS C01B025-45; H01M006-18; H01M010-36
 CC 76-2 (Electric Phenomena)
 Section cross-reference(s): 52, 57
 ST lithium ion conductor nonsintered solid **electrolyte**;
 titanium lithium phosphate amorphous solid **electrolyte**;
 sulfide glass nonsintered solid **electrolyte**

- battery**
- IT Sulfide glasses
(lithium phosphorus sulfide; non-sintered Li-conductive solid **electrolytes** for **batteries**)
- IT Phosphate glasses
(lithium silicon phosphate sulfide; non-sintered Li-conductive solid **electrolytes** for **batteries**)
- IT Fuel cell **electrolytes**
Solid **electrolytes**
(non-sintered Li-conductive solid **electrolytes** for **batteries**)
- IT 12136-58-2P, Lithium sulfide (Li_2S)
(glass contg.; non-sintered Li-conductive solid **electrolytes** for **batteries**)
- IT 30622-39-0P, Lithium titanium phosphate ($\text{LiTi}_2(\text{PO}_4)_3$)
120479-61-0P, Aluminum lithium titanium phosphate
($\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$)
(non-sintered Li-conductive solid **electrolytes** for **batteries**)
- IT 10377-52-3P, Lithium phosphate 13759-10-9P, Silicon sulfide (SiS_2)
(oxysulfide glass contg.; non-sintered Li-conductive solid **electrolytes** for **batteries**)
- IT 1314-80-3P, Phosphorus sulfide (P_2S_5)
(sulfide glass contg.; non-sintered Li-conductive solid **electrolytes** for **batteries**)
- L24 ANSWER 2 OF 10 HCA COPYRIGHT 2002 ACS
- 128:77543 Ionic conductivity enhancement in $\text{LiGe}_2(\text{PO}_4)_3$ solid **electrolyte**. Yamamoto, Hiroshi; Tabuchi, Mitsuharu; Takeuchi, Tomonari; Kageyama, Hiroyuki; Nakamura, Osamu (Amagasaki, 1 Nishino-cho Higashimukojima, Advanced Technology Research Laboratories, Sumitomo Metal Industries, Ltd., Hyogo 660, Japan). Journal of Power Sources, 68(2), 397-401 (English) 1997. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science S.A..
- AB To improve the ionic cond. of $\text{LiGe}_2(\text{PO}_4)_3$ as a solid **electrolyte** for lithium **batteries**, the authors have examd. the effects of Al^{3+} and Y^{3+} substitution for Ge^{4+} and of $\text{LiOH} \cdot \text{H}_2\text{O}$ addn. on the ionic cond. The ionic cond. of $\text{LiGe}_2(\text{PO}_4)_3$ is enhanced four orders of magnitude by Al^{3+} addn., i.e., 1.3 .times. 10^{-4} S/cm at 23.degree. in case of the $\text{Li}_{1.4}\text{Al}_{0.4}\text{Ge}_{1.6}(\text{PO}_4)_3$. The addn. of Y_2O_3 or lithium salt also enhances the ionic cond. because of the acceleration of the **sintering** process by the second phase of $\text{Li}_4\text{P}_2\text{O}_7$.
- IT 200496-89-5, Germanium lithium yttrium phosphate ($\text{Ge}_{1.6}\text{Li}_{1.4}\text{Y}_{0.4}(\text{PO}_4)_3$) 200496-90-8, Germanium lithium yttrium phosphate ($\text{Ge}_{1.8}\text{Li}_{1.2}\text{Y}_{0.2}(\text{PO}_4)_3$)
(ionic cond. of germanium lithium yttrium phosphate solid **battery electrolytes**)
- RN 200496-89-5 HCA
- CN Germanium lithium yttrium phosphate ($\text{Ge}_{1.6}\text{Li}_{1.4}\text{Y}_{0.4}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Y	0.4	7440-65-5
Ge	1.6	7440-56-4
Li	1.4	7439-93-2

RN 200496-90-8 HCA

CN Germanium lithium yttrium phosphate (Ge_{1.8}Li_{1.2}Y_{0.2}(PO₄)₃) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Y	0.2	7440-65-5
Ge	1.8	7440-56-4
Li	1.2	7439-93-2

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 76

ST germanium lithium phosphate **electrolyte** ionic cond;
aluminum germanium lithium phosphate **electrolyte** cond;
yttrium germanium lithium phosphate **electrolyte** cond;
battery germanium lithium phosphate **electrolyte**
cond

IT **Battery electrolytes**

Ionic conductivity

(ionic cond. enhancement of germanium lithium phosphate solid
battery electrolytes by addn. of aluminum
oxide, yttrium oxide, or lithium salt)

IT 78538-41-7, Germanium lithium phosphate [Ge₂Li(PO₄)₃]
(ionic cond. enhancement of germanium lithium phosphate solid
battery electrolytes by addn. of aluminum
oxide, yttrium oxide, or lithium salt)

IT 1310-66-3, Lithium hydroxide hydrate 1314-36-9, Yttria, uses
1344-28-1, Alumina, uses
(ionic cond. enhancement of germanium lithium phosphate solid
battery electrolytes by addn. of aluminum
oxide, yttrium oxide, or lithium salt)

IT 119356-71-7, Aluminum germanium lithium phosphate
[Al_{0.2}Ge_{1.8}Li_{1.2}(PO₄)₃] 119356-73-9, Aluminum germanium lithium
phosphate [Al_{0.4}Ge_{1.6}Li_{1.4}(PO₄)₃]
(ionic cond. of aluminum germanium lithium phosphate solid
battery electrolytes)

IT 200496-89-5, Germanium lithium yttrium phosphate
(Ge_{1.6}Li_{1.4}Y_{0.4}(PO₄)₃) 200496-90-8, Germanium lithium
yttrium phosphate (Ge_{1.8}Li_{1.2}Y_{0.2}(PO₄)₃)
(ionic cond. of germanium lithium yttrium phosphate solid)

battery electrolytes)

L24 ANSWER 3 OF 10 HCA COPYRIGHT 2002 ACS

121:146570 Ceramic solid **electrolyte** obtained by **sintering**. Nakayama, Susumu; Kuroshima, Hiroshi (Shinagawa Refractories Co, Japan). Jpn. Kokai Tokkyo Koho JP 06080462 A2 19940322 Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-231856 19920831.

AB The solid **electrolyte** is obtained by mixing a ceramic **electrolyte** with high elec. cond. with .1toreq.40 wt.% ionic conductor **electrolyte** contg. the same ions as those of the ceramic **electrolyte** and more glass components and **sintering**. The **electrolyte** obtained by **sintering** at 900-1100.degree. showed high elec. cond.

IT 150232-17-0, Indium lithium titanium phosphate (In_{0.4}Li_{1.4}Ti_{1.6}(PO₄)₃)

(ceramics, low-temp. **sintering** of, solid **electrolyte** from)

RN 150232-17-0 HCA

CN Indium lithium titanium phosphate (In_{0.4}Li_{1.4}Ti_{1.6}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
In	0.4	7440-74-6
Ti	1.6	7440-32-6
Li	1.4	7439-93-2

IC ICM C04B035-00

ICS H01B001-06

CC 76-2 (Electric Phenomena)

Section cross-reference(s): 57

ST ceramic oxide **electrolyte** solid **sintering**

IT Electric conductors, ceramic

(oxide, manuf. of, by low-temp. **sintering**, with high elec. cond., for solid **electrolyte**)

IT 6834-92-0 7601-54-9, Sodium phosphate 10102-24-6, Lithium silicon oxide (Li₂SiO₃) 10377-52-3, Lithium phosphate 12003-51-9 12003-67-7, Lithium aluminum oxide (LiAlO₂) 13465-88-8 13465-97-9, Silver phosphorus oxide (Ag₄P₂O₇) 13497-94-4, Silver vanadium oxide (AgVO₃) 16625-98-2 19497-94-0 22307-58-0 28132-50-5, Sodium zirconium phosphate [Na₂Zr(PO₄)₂] 34370-43-9 58572-20-6, Sodium zirconium phosphate silicate (Na₃Zr₂(PO₄)(SiO₄)₂) 76572-26-4 129039-87-8, Silver zirconium phosphate silicate (Ag₃Zr₂(PO₄)(SiO₄)₂) 150232-17-0, Indium lithium titanium phosphate (In_{0.4}Li_{1.4}Ti_{1.6}(PO₄)₃) 157281-79-3, Lithium samarium oxide silicate (Li₄Sm₂O(SiO₄)₂) 157281-80-6, Gadolinium sodium oxide silicate (Gd₂Na₄O(SiO₄)₂) (ceramics, low-temp. **sintering** of, solid **electrolyte** from)

IT 157322-04-8P 157322-05-9P 157322-06-0P 157322-07-1P
157322-08-2P, Indium lithium phosphorus titanium oxide
157322-09-3P 157322-10-6P 157322-11-7P 157322-12-8P
157322-13-9P 157322-14-0P 157322-15-1P 157322-16-2P
157322-17-3P

(ceramics, solid **electrolyte**, prepn. of, by low-temp.
sintering, with high elec. cond.)

L24 ANSWER 4 OF 10 HCA COPYRIGHT 2002 ACS

120:111719 Solid **electrolytes** and lithium **batteries**
using the **electrolytes**. Shoji, Yoshihiro; Nishio, Koji;
Furukawa, Saneshiro (Sanyo Electric Co., Japan). Jpn. Kokai Tokkyo
Koho JP 05299101 A2 19931112 Heisei, 7 pp. (Japanese). CODEN:
JKXXAF. APPLICATION: JP 1992-180349 19920615. PRIORITY: JP
1992-69472 19920218.

AB The **electrolytes** are **sintered** products of
 $\text{Li}_{1+(4-n)}\text{M}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ granules, where M is mono- or di-valent
cations, n = valence of the cation, and x = 0.1-0.5. The
electrolyte may also be a **sintered** mixt. of the
above granules and a 2nd low. m.p. **electrolyte** granules of
smaller size. The 2nd **electrolyte** granules are preferably
 $\text{Li}_{1+(4-n)}\text{M}_x\text{Zr}_{2-x}(\text{PO}_4)_3$.

IT **152829-88-4**, Lithium magnesium zirconium phosphate
 $(\text{Li}_{1.4}\text{Mg}_{0.2}\text{Zr}_{1.8}(\text{PO}_4)_3)$ **152829-90-8**, Iron lithium
zirconium phosphate $(\text{Fe}_{0.2}\text{Li}_{1.4}\text{Zr}_{1.8}(\text{PO}_4)_3)$ **152829-94-2**,
Lithium magnesium zirconium phosphate $(\text{Li}_{1.2}\text{Mg}_{0.1}\text{Zr}_{1.9}(\text{PO}_4)_3)$
152829-95-3, Lithium magnesium zirconium phosphate
 $(\text{Li}_{1.6}\text{Mg}_{0.3}\text{Zr}_{1.7}(\text{PO}_4)_3)$ **152829-97-5**, Iron lithium titanium
phosphate $(\text{Fe}_{0.1}\text{Li}_{1.2}\text{Ti}_{1.9}(\text{PO}_4)_3)$ **152829-98-6**, Iron
lithium titanium phosphate $(\text{Fe}_{0.3}\text{Li}_{1.6}\text{Ti}_{1.7}(\text{PO}_4)_3)$
152830-00-7, Iron lithium titanium phosphate
 $(\text{Fe}_{0.5}\text{Li}_{1.2}\text{Ti}_{1.9}(\text{PO}_4)_3)$ **152830-01-8**, Iron lithium
zirconium phosphate $(\text{Fe}_{0.3}\text{Li}_{1.6}\text{Zr}_{1.7}(\text{PO}_4)_3)$
(**electrolyte** contg., for lithium **batteries**)

RN 152829-88-4 HCA

CN Lithium magnesium zirconium phosphate $(\text{Li}_{1.4}\text{Mg}_{0.2}\text{Zr}_{1.8}(\text{PO}_4)_3)$ (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Zr	1.8	7440-67-7
Mg	0.2	7439-95-4
Li	1.4	7439-93-2

RN 152829-90-8 HCA

CN Iron lithium zirconium phosphate $(\text{Fe}_{0.2}\text{Li}_{1.4}\text{Zr}_{1.8}(\text{PO}_4)_3)$ (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
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Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.8	7440-67-7
Li	1.4	7439-93-2
Fe	0.2	7439-89-6

RN 152829-94-2 HCA

CN Lithium magnesium zirconium phosphate ($\text{Li}_{1.2}\text{Mg}_{0.1}\text{Zr}_{1.9}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.9	7440-67-7
Mg	0.1	7439-95-4
Li	1.2	7439-93-2

RN 152829-95-3 HCA

CN Lithium magnesium zirconium phosphate ($\text{Li}_{1.6}\text{Mg}_{0.3}\text{Zr}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.7	7440-67-7
Mg	0.3	7439-95-4
Li	1.6	7439-93-2

RN 152829-97-5 HCA

CN Iron lithium titanium phosphate ($\text{Fe}_{0.1}\text{Li}_{1.2}\text{Ti}_{1.9}(\text{PO}_4)_3$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Li	1.2	7439-93-2
Fe	0.1	7439-89-6

RN 152829-98-6 HCA

CN Iron lithium titanium phosphate ($\text{Fe}_{0.3}\text{Li}_{1.6}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.6	7439-93-2

Fe	0.3	7439-89-6
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RN 152830-00-7 HCA

CN Iron lithium titanium phosphate (Fe_{0.5}Li_{1.2}Ti_{1.9}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Li	1.2	7439-93-2
Fe	0.5	7439-89-6

RN 152830-01-8 HCA

CN Iron lithium zirconium phosphate (Fe_{0.3}Li_{1.6}Zr_{1.7}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Zr	1.7	7440-67-7
Li	1.6	7439-93-2
Fe	0.3	7439-89-6

IT 152829-87-3, Lithium magnesium titanium phosphate (Li_{1.4}Mg_{0.2}Ti_{1.8}(PO₄)₃) 152829-89-5, Iron lithium titanium phosphate (Fe_{0.2}Li_{1.4}Ti_{1.8}(PO₄)₃) 152829-91-9, Lithium magnesium titanium phosphate (Li_{1.2}Mg_{0.1}Ti_{1.9}(PO₄)₃) 152829-92-0, Lithium magnesium titanium phosphate (Li_{1.6}Mg_{0.3}Ti_{1.7}(PO₄)₃) (electrolyte, for lithium batteries)

RN 152829-87-3 HCA

CN Lithium magnesium titanium phosphate (Li_{1.4}Mg_{0.2}Ti_{1.8}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ti	1.8	7440-32-6
Mg	0.2	7439-95-4
Li	1.4	7439-93-2

RN 152829-89-5 HCA

CN Iron lithium titanium phosphate (Fe_{0.2}Li_{1.4}Ti_{1.8}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
-----------	-------	---------------------------

O4P	3	14265-44-2
Ti	1.8	7440-32-6
Li	1.4	7439-93-2
Fe	0.2	7439-89-6

RN 152829-91-9 HCA

CN Lithium magnesium titanium phosphate (Li1.2Mg0.1Ti1.9(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.9	7440-32-6
Mg	0.1	7439-95-4
Li	1.2	7439-93-2

RN 152829-92-0 HCA

CN Lithium magnesium titanium phosphate (Li1.6Mg0.3Ti1.7(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Mg	0.3	7439-95-4
Li	1.6	7439-93-2

IC ICM H01M006-18

ICS H01M010-36

CC 52-2 (Electrochemical, Radiational, and Thermal Energy
Technology)ST lithium **battery electrolyte**; lithium titanium
phosphate **battery electrolyte**; zirconium lithium
phosphate **battery electrolyte**IT **Battery electrolytes**(lithium titanium phosphate and lithium zirconium phosphate,
comps. of)

IT Electric conductivity and conduction

(of lithium titanium phosphate and lithium zirconium phosphate
electrolytes for lithium **batteries**)

IT 152829-88-4, Lithium magnesium zirconium phosphate

(Li1.4Mg0.2Zr1.8(PO4)3) 152829-90-8, Iron lithium
zirconium phosphate (Fe0.2Li1.4Zr1.8(PO4)3) 152829-93-1

152829-94-2, Lithium magnesium zirconium phosphate

(Li1.2Mg0.1Zr1.9(PO4)3) 152829-95-3, Lithium magnesium
zirconium phosphate (Li1.6Mg0.3Zr1.7(PO4)3) 152829-96-4

152829-97-5, Iron lithium titanium phosphate

(Fe0.1Li1.2Ti1.9(PO4)3) 152829-98-6, Iron lithium titanium
phosphate (Fe0.3Li1.6Ti1.7(PO4)3) 152829-99-7 152830-00-7

, Iron lithium titanium phosphate (Fe0.5Li1.2Ti1.9(PO4)3)

- 152830-01-8, Iron lithium zirconium phosphate
($\text{Fe}_{0.3}\text{Li}_{1.6}\text{Zr}_{1.7}(\text{PO}_4)_3$) 152830-02-9
(electrolyte contg., for lithium batteries)
- IT 152829-87-3, Lithium magnesium titanium phosphate
($\text{Li}_{1.4}\text{Mg}_{0.2}\text{Ti}_{1.8}(\text{PO}_4)_3$) 152829-89-5, Iron lithium titanium
phosphate ($\text{Fe}_{0.2}\text{Li}_{1.4}\text{Ti}_{1.8}(\text{PO}_4)_3$) 152829-91-9, Lithium
magnesium titanium phosphate ($\text{Li}_{1.2}\text{Mg}_{0.1}\text{Ti}_{1.9}(\text{PO}_4)_3$)
152829-92-0, Lithium magnesium titanium phosphate
($\text{Li}_{1.6}\text{Mg}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$)
(electrolyte, for lithium batteries)
- L24 ANSWER 5 OF 10 HCA COPYRIGHT 2002 ACS
- 119:192527 The electrical properties of ceramic **electrolytes**
for lithium metal titanium phosphate ($\text{LiMxTi}_2\text{-x}(\text{PO}_4)_3$ + dilithium
oxide, M = germanium, tin, hafnium, and zirconium systems. Aono,
Hiromichi; Sugimoto, Eisuki; Sadaoka, Yoshihiko; Imanaka, Nobuhito;
Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol.,
Niihama, 792, Japan). Journal of the Electrochemical Society,
140(7), 1827-33 (English) 1993. CODEN: JESOAN. ISSN: 0013-4651.
- AB The elec. properties of systems of $\text{LiMxTi}_2\text{-x}(\text{PO}_4)_3$ + $y\text{Li}_2\text{O}$ (M = Ge,
Sn, Hf, Zr) were examd. The cond. and the **sinterability**
increased with the amt. of excess Li_2O in the phosphate. The
secondary Li_2O phase acts as a flux to accelerate the
sintering process and to obtain high cond. grain boundaries.
The cond. decreased and the activation energy of the bulk component
for Li^+ migration increased by the partial substitution of Ti^{4+} for
 M^{4+} in systems of $\text{LiMxTi}_2\text{-x}(\text{PO}_4)_3$ + $0.2\text{Li}_2\text{O}$. A min. activation
energy of 0.28-0.30 eV, was obtained for the sample with .apprx.1310
.ANG.3 in the cell vol. $\text{LiTi}_2(\text{PO}_4)_3$ has the most suitable tunnel
size for a Li^+ migration through the NASICON-type network structure.
- IT 150477-37-5 150477-38-6, Hafnium lithium titanium
oxide phosphate ($(\text{Hf,Ti})_2\text{Li}_{1.4}\text{O}_{0.2}(\text{PO}_4)_3$) 150477-39-7,
Lithium tin titanium oxide phosphate ($\text{Li}_{1.4}(\text{Sn,Ti})_2\text{O}_{0.2}(\text{PO}_4)_3$)
150477-40-0
(crystal structure and elec. cond. of, compn. effect on)
- RN 150477-37-5 HCA
- CN Lithium titanium zirconium oxide phosphate ($\text{Li}_{1.4}(\text{Ti,Zr})_2\text{O}_{0.2}(\text{PO}_4)_3$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.2	17778-80-2
O4P	3	14265-44-2
Zr	0 - 2	7440-67-7
Ti	0 - 2	7440-32-6
Li	1.4	7439-93-2

- RN 150477-38-6 HCA
- CN Hafnium lithium titanium oxide phosphate ($(\text{Hf,Ti})_2\text{Li}_{1.4}\text{O}_{0.2}(\text{PO}_4)_3$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.2	17778-80-2
O4P	3	14265-44-2
Hf	0 - 2	7440-58-6
Ti	0 - 2	7440-32-6
Li	1.4	7439-93-2

RN 150477-39-7 HCA

CN Lithium tin titanium oxide phosphate (Li1.4(Sn,Ti)2O0.2(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.2	17778-80-2
O4P	3	14265-44-2
Ti	0 - 2	7440-32-6
Sn	0 - 2	7440-31-5
Li	1.4	7439-93-2

RN 150477-40-0 HCA

CN Germanium lithium titanium oxide phosphate ((Ge,Ti)2Li1.4O0.2(PO4)3)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.2	17778-80-2
O4P	3	14265-44-2
Ge	0 - 2	7440-56-4
Ti	0 - 2	7440-32-6
Li	1.4	7439-93-2

IT 150477-41-1, Lithium zirconium oxide phosphate
(Li1-2Zr2O0-0.5(PO4)3) 150477-42-2, Hafnium lithium oxide
phosphate (Hf2Li1-1.8O0-0.4(PO4)3) 150477-44-4, Lithium
titanium oxide phosphate (Li1-1.8Ti2O0-0.4(PO4)3)
(porosity and elec. cond. and crystal structure of, compn. effect
on)

RN 150477-41-1 HCA

CN Lithium zirconium oxide phosphate (Li1-2Zr2O0-0.5(PO4)3) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0 - 0.5	17778-80-2
O4P	3	14265-44-2
Zr	2	7440-67-7
Li	1 - 2	7439-93-2

RN 150477-42-2 HCA

CN Hafnium lithium oxide phosphate (Hf₂Li_{1-1.8}O_{0-0.4}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O	0 - 0.4	17778-80-2
O4P	3	14265-44-2
Hf	2	7440-58-6
Li	1 - 1.8	7439-93-2

RN 150477-44-4 HCA

CN Lithium titanium oxide phosphate (Li_{1-1.8}Ti₂O_{0-0.4}(PO₄)₃) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O	0 - 0.4	17778-80-2
O4P	3	14265-44-2
Ti	2	7440-32-6
Li	1 - 1.8	7439-93-2

CC 76-1 (Electric Phenomena)

Section cross-reference(s): 75

IT 150477-37-5 150477-38-6, Hafnium lithium titanium oxide phosphate ((Hf,Ti)₂Li_{1.4}O_{0.2}(PO₄)₃) 150477-39-7, Lithium tin titanium oxide phosphate (Li_{1.4}(Sn,Ti)₂O_{0.2}(PO₄)₃) 150477-40-0

(crystal structure and elec. cond. of, compn. effect on)

IT 19527-80-1, Lithium zirconium phosphate li₂zr₂(po₄)₃ 19527-83-4, Hafnium lithium phosphate hf₂li(po₄)₃ 30622-39-0, Lithium titanium phosphate li₂ti₂(po₄)₃ 58797-94-7, Lithium tin phosphate li₂sn₂(po₄)₃ 78538-41-7, Germanium lithium phosphate ge₂li(po₄)₃ (elec. cond. and crystal structure of, lithium oxide addns. and sintering effect on)

IT 150477-41-1, Lithium zirconium oxide phosphate (Li₁₋₂Zr₂O_{0-0.5}(PO₄)₃) 150477-42-2, Hafnium lithium oxide phosphate (Hf₂Li_{1-1.8}O_{0-0.4}(PO₄)₃) 150477-43-3, Lithium tin oxide phosphate (Li_{1-1.8}Sn₂O_{0-0.4}(PO₄)₃) 150477-44-4, Lithium titanium oxide phosphate (Li_{1-1.8}Ti₂O_{0-0.4}(PO₄)₃) 150477-45-5, Germanium lithium oxide phosphate (Ge₂Li_{1-1.8}O_{0-0.4}(PO₄)₃) (porosity and elec. cond. and crystal structure of, compn. effect on)

L24 ANSWER 6 OF 10 HCA COPYRIGHT 2002 ACS

117:223861 Substitution effect of framework constituents on electrical property of solid **electrolytes** with .beta.-Fe₂(SO₄)₃-type structure, M₁+XZr₂P₃-XSiXO₁₂ (M = Li, 1/2Mg, and 1/2Zn). Nomura, Katsuhiro; Ikeda, Shoichiro; Ito, Kaname; Einaga, Hisahiko (Fac.

Eng., Nagoya Inst. Technol., Nagoya, 466, Japan). Chemistry Letters (10), 1897-900 (English) 1992. CODEN: CMLTAG. ISSN: 0366-7022.

AB An enhancement of elec. cond. was obsd. by substitution of Si⁴⁺ for P⁵⁺ in LiZr₂(PO₄)₃, MgZr₄(PO₄)₆, and ZnZr₄(PO₄)₆ solid **electrolytes** with a .beta.-Fe₂(SO₄)₃-type structure. An increase in the concn. of interstitial Li⁺ ion resulted in the cond. enhancement for the Li compd., whereas an increase in the compactness of **sintered** specimen for the Mg and Zn compds.

IT **144390-73-8**, Lithium zirconium phosphate silicate (Li_{1.1}Zr₂(PO₄)_{2.9}(SiO₄)_{0.1}) **144390-74-9**, Lithium zirconium phosphate silicate (Li_{1.2}Zr₂(PO₄)_{2.8}(SiO₄)_{0.2}) **144390-75-0**, Lithium zirconium phosphate silicate (Li_{1.3}Zr₂(PO₄)_{2.7}(SiO₄)_{0.3}) **144390-76-1**, Lithium zirconium phosphate silicate (Li_{1.4}Zr₂(PO₄)_{2.6}(SiO₄)_{0.4}) **144390-77-2**, Lithium zirconium phosphate silicate (Li_{1.5}Zr₂(PO₄)_{2.5}(SiO₄)_{0.5}) (elec. cond. of solid **electrolyte** of)

RN 144390-73-8 HCA

CN Lithium zirconium phosphate silicate (Li_{1.1}Zr₂(PO₄)_{2.9}(SiO₄)_{0.1}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.1	17181-37-2
O4P	2.9	14265-44-2
Zr	2	7440-67-7
Li	1.1	7439-93-2

RN 144390-74-9 HCA

CN Lithium zirconium phosphate silicate (Li_{1.2}Zr₂(PO₄)_{2.8}(SiO₄)_{0.2}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.2	17181-37-2
O4P	2.8	14265-44-2
Zr	2	7440-67-7
Li	1.2	7439-93-2

RN 144390-75-0 HCA

CN Lithium zirconium phosphate silicate (Li_{1.3}Zr₂(PO₄)_{2.7}(SiO₄)_{0.3}) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.3	17181-37-2
O4P	2.7	14265-44-2
Zr	2	7440-67-7
Li	1.3	7439-93-2

RN 144390-76-1 HCA
 CN Lithium zirconium phosphate silicate (Li1.4Zr2(PO4)2.6(SiO4)0.4)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.4	17181-37-2
O4P	2.6	14265-44-2
Zr	2	7440-67-7
Li	1.4	7439-93-2

RN 144390-77-2 HCA
 CN Lithium zirconium phosphate silicate (Li1.5Zr2(PO4)2.5(SiO4)0.5)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.5	17181-37-2
O4P	2.5	14265-44-2
Zr	2	7440-67-7
Li	1.5	7439-93-2

CC 76-2 (Electric Phenomena)

ST cond solid **electrolyte** silicon substitution; lithium
 zirconium silicon phosphate cond; magnesium silicon zirconium
 phosphate cond; zinc zirconium phosphate silicate cond

IT Electric conductivity and conduction
 (of solid-**electrolytes** phosphates, silicon substitution
 effect on)

IT 67972-93-4 **144390-73-8**, Lithium zirconium phosphate
 silicate (Li1.1Zr2(PO4)2.9(SiO4)0.1) **144390-74-9**, Lithium
 zirconium phosphate silicate (Li1.2Zr2(PO4)2.8(SiO4)0.2)
144390-75-0, Lithium zirconium phosphate silicate
 (Li1.3Zr2(PO4)2.7(SiO4)0.3) **144390-76-1**, Lithium zirconium
 phosphate silicate (Li1.4Zr2(PO4)2.6(SiO4)0.4) **144390-77-2**
 , Lithium zirconium phosphate silicate (Li1.5Zr2(PO4)2.5(SiO4)0.5)
 144390-78-3, Magnesium zirconium phosphate silicate
 (Mg1.05Zr4(PO4)5.9(SiO4)0.1) 144390-79-4, Magnesium zirconium
 phosphate silicate (Mg1.1Zr4(PO4)5.8(SiO4)0.2) 144390-80-7,
 Magnesium zirconium phosphate silicate (Mg1.15Zr4(PO4)5.7(SiO4)0.3)
 144390-81-8, Magnesium zirconium phosphate silicate
 (Mg1.2Zr4(PO4)5.6(SiO4)0.4) 144390-82-9, Magnesium zirconium
 phosphate silicate (Mg1.25Zr4(PO4)5.5(SiO4)0.5) 144390-83-0, Zinc
 zirconium phosphate silicate (Zn1.05Zr4(PO4)5.9(SiO4)0.1)
 144390-84-1, Zinc zirconium phosphate silicate
 (Zn1.1Zr4(PO4)5.8(SiO4)0.2) 144390-85-2, Zinc zirconium phosphate
 silicate (Zn1.15Zr4(PO4)5.7(SiO4)0.3) 144390-86-3, Zinc zirconium
 phosphate silicate (Zn1.2Zr4(PO4)5.6(SiO4)0.4) 144390-87-4, Zinc
 zirconium phosphate silicate (Zn1.25Zr4(PO4)5.5(SiO4)0.5)
 (elec. cond. of solid **electrolyte** of)

- IT 62585-92-6
(elec. cond. of solid **electrolyte** of, effect of silicon substitution on)
- IT 19527-80-1
(elec. cond. of solid **electrolyte**, effect of silicon substitution in)
- IT 7440-21-3, Silicon, properties
(elec. cond. of solid-**electrolyte** phosphates affected by substitution with)
- L24 ANSWER 7 OF 10 HCA COPYRIGHT 2002 ACS
- 117:202629 Electrical properties and **sinterability** for lithium germanium phosphate $\text{Li}_{1+x}\text{M}_x\text{Ge}_{2-x}(\text{PO}_4)_3$, M = aluminum, chromium, gallium, iron, scandium, and indium systems. Aono, Hiromichi; Sugimoto, Eisuke; Sadaoka, Yoshhiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Bulletin of the Chemical Society of Japan, 65(8), 2200-4 (English) 1992. CODEN: BCSJA8. ISSN: 0009-2673.
- AB The elec. properties and **sinterability** were studied for $\text{Li}_{1+x}\text{M}_x\text{Ge}_{2-x}(\text{PO}_4)_3$, M = Al^{3+} , Cr^{3+} , Ga^{3+} , Fe^{3+} , Se^{3+} , and In^{3+} systems. Due to the closer ionic radius of Al^{3+} and Cr^{3+} compared to that of Ge^{4+} , those M^{3+} ions easily substitute the Ge^{4+} site. Larger cations, such as Ga^{3+} , Fe^{3+} , Sc^{3+} , and In^{3+} , were difficult to substitute the Ge^{4+} site. The ionic cond. and **sinterability** improved with an increase in x for all of the M^{3+} -substituted systems. In particular, an Al^{3+} - or Cr^{3+} -substituted system shows higher cond.; the max. cond. is 2.4.times.10⁻⁴ S cm⁻¹ at 298 ~K for $\text{Li}_{1.5}\text{Al}_{0.5}\text{Ge}_{1.5}(\text{PO}_4)_3$. The enhancement in the cond. is attributed to a decrease in the porosity and a lowering of the activation energy in the grain boundaries. The activation energy for Li^+ ion conduction of the bulk component was 0.38 eV for $\text{Li}_{1+x}\text{M}_x\text{Ge}_{2-x}(\text{PO}_4)_3$ **electrolytes**, and was almost independent of M^{3+} substitution.
- IT 108730-48-9, Chromium germanium lithium phosphate ($\text{Cr}_{0.3}\text{Ge}_{1.7}\text{Li}_{1.3}(\text{PO}_4)_3$) **144048-56-6**, Germanium iron lithium phosphate ($\text{Ge}_{1.7}\text{Fe}_{0.3}\text{Li}_{1.3}(\text{PO}_4)_3$) **144048-57-7**, Germanium lithium scandium phosphate ($\text{Ge}_{1.7}\text{Li}_{1.3}\text{Sc}_{0.3}(\text{PO}_4)_3$) **144048-60-2**, Chromium germanium lithium phosphate ($\text{Cr}_{0.7}\text{Ge}_{1.3}\text{Li}_{1.7}(\text{PO}_4)_3$)
(elec. cond. of)
- RN 108730-48-9 HCA
- CN Chromium germanium lithium phosphate ($\text{Cr}_{0.3}\text{Ge}_{1.7}\text{Li}_{1.3}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ge	1.7	7440-56-4
Cr	0.3	7440-47-3
Li	1.3	7439-93-2

RN 144048-56-6 HCA
 CN Germanium iron lithium phosphate (Ge1.7Fe0.3Li1.3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.7	7440-56-4
Li	1.3	7439-93-2
Fe	0.3	7439-89-6

RN 144048-57-7 HCA
 CN Germanium lithium scandium phosphate (Ge1.7Li1.3Sc0.3(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.7	7440-56-4
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

RN 144048-60-2 HCA
 CN Chromium germanium lithium phosphate (Cr0.7Ge1.3Li1.7(PO4)3) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O4P	3	14265-44-2
Ge	1.3	7440-56-4
Cr	0.7	7440-47-3
Li	1.7	7439-93-2

CC 76-2 (Electric Phenomena)
 IT 78538-41-7, Germanium lithium phosphate (ge2li(po4)3) 108431-08-9
108730-48-9, Chromium germanium lithium
 phosphate (cr0.3ge1.7li1.3(po4)3) 109210-49-3 119356-72-8,
 Aluminum germanium lithium phosphate (al0.3ge1.7li1.3(po4)3)
 144048-55-5, Gallium germanium lithium phosphate
 (Ga0.3Ge1.7Li1.3(PO4)3) **144048-56-6**, Germanium iron
 lithium phosphate (Ge1.7Fe0.3Li1.3(PO4)3) **144048-57-7**,
 Germanium lithium scandium phosphate (Ge1.7Li1.3Sc0.3(PO4)3)
 144048-58-8, Germanium indium lithium phosphate
 (Ge1.7In0.3Li1.3(PO4)3) 144048-59-9, Aluminum germanium lithium
 phosphate (Al0.7Ge1.3Li1.7(PO4)3) **144048-60-2**, Chromium
 germanium lithium phosphate (Cr0.7Ge1.3Li1.7(PO4)3) 144189-67-3
 144189-68-4 144189-69-5 144189-70-8
 (elec. cond. of)

L24 ANSWER 8 OF 10 HCA COPYRIGHT 2002 ACS

114:27157 Electrical properties of **sintered** lithium titanium phosphate ceramics ($\text{Li}_{1+x}\text{M}_x\text{Ti}_2\text{-x}(\text{PO}_4)_3$, $\text{M}^{3+} = \text{Al}^{3+}, \text{Sc}^{3+}, \text{Y}^{3+}$). Aono, Hiromichi; Sugimoto, Eisuke; Sadaoka, Yoshihiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Chemistry Letters (10), 1825-8 (English) 1990. CODEN: CMLTAG. ISSN: 0366-7022.

AB The activation energy of ionic cond. was measured for bulk and grain boundary of $\text{Li}_{1+x}\text{M}_x\text{Ti}_2\text{-x}(\text{PO}_4)_3$ ceramic systems ($\text{M} = \text{Al}, \text{Sc}, \text{Y}$; $x = 0.0\text{-}0.5$), to select suitable materials for solid **electrolyte batteries**. The total cond. of the systems increased with trivalent cation content for all the metals and is attributed to a decrease in the activation energy of cond. of the grain boundary.

IT **127887-18-7**, Lithium scandium titanium phosphate [$\text{Li}_{1.3}\text{Sc}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$] **131266-84-7 131266-85-8 131266-87-0 131266-88-1 131329-45-8**

(elec. cond. of ceramic, bulk and grain boundary, activation energy of, for **battery electrolyte**)

RN 127887-18-7 HCA

CN Lithium scandium titanium phosphate ($\text{Li}_{1.3}\text{Sc}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

RN 131266-84-7 HCA

RN 131266-85-8 HCA

CN Lithium scandium titanium phosphate ($\text{Li}_{1.4}\text{Sc}_{0.4}\text{Ti}_{1.6}(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.6	7440-32-6
Sc	0.4	7440-20-2
Li	1.4	7439-93-2

RN 131266-87-0 HCA

CN Lithium titanium yttrium phosphate ($\text{Li}_{1.2}\text{Ti}_{1.8}\text{Y}_{0.2}(\text{PO}_4)_3$) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Y	0.2	7440-65-5

Ti		1.8		7440-32-6
Li		1.2		7439-93-2

RN 131266-88-1 HCA
 RN 131329-45-8 HCA
 CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 57, 76
 ST lithium titanium phosphate ceramic cond; aluminum lithium titanium phosphate cond; scandium lithium titanium phosphate cond; yttrium lithium titanium phosphate cond; **battery electrolyte** ceramic phosphate cond
 IT Electric conductivity and conduction
 (of lithium metal titanium phosphate ceramics, metal substituent effect on, for **battery electrolyte**)
 IT **Batteries**, secondary
 (solid-**electrolyte**, lithium metal titanium phosphate ceramics for, elec. cond. of, metal substituent effect on)
 IT 30622-39-0, Lithium titanium phosphate [LiTi₂(PO₄)₃]
127887-18-7, Lithium scandium titanium phosphate [Li_{1.3}Sc_{0.3}Ti_{1.7}(PO₄)₃] 131266-80-3 131266-81-4 131266-82-5
 131266-83-6 **131266-84-7** **131266-85-8**
 131266-86-9 **131266-87-0** **131266-88-1**
 131266-89-2 **131329-45-8**
 (elec. cond. of ceramic, bulk and grain boundary, activation energy of, for **battery electrolyte**)

L24 ANSWER 9 OF 10 HCA COPYRIGHT 2002 ACS
 113:32564 Ionic conductivity of solid **electrolytes** based on lithium titanium phosphate. Aono, Hiromichi; Sugimoto, Eisuke; Sadaoka, Yoshihiko; Imanaka, Nobuhito; Adachi, Ginya (Dep. Ind. Chem., Niihama Natl. Coll. Technol., Niihama, 792, Japan). Journal of the Electrochemical Society, 137(4), 1023-7 (English) 1990. CODEN: JESOAN. ISSN: 0013-4651.

AB Solid **electrolytes** based on lithium titanium phosphate were prepd., and their phase, porosity of the **sintered** pellets, and elec. cond. were studied. The cond. was increased and the porosity decreased greatly by partially replacing Ti⁴⁺ and P⁵⁺ in LiTi₂(PO₄)₃ with M³⁺ (M³⁺ = Al³⁺, Cr³⁺, Ga³⁺, Fe³⁺, Sc³⁺, In³⁺, Lu³⁺, Y³⁺, and La³⁺) and Si⁴⁺ ions, resp. The max. cond. at 298 K is 7 .times. 10⁻⁴ S cm⁻¹ for Li_{1.3}M_{0.3}Ti_{1.7}(PO₄)₃ (M = Al and Sc). The cond. was considerably increased by the mixing of binders such as Li₂O or Li₄P₂O₇ with LiTi₂(PO₄)₃. The main reason for the cond. enhancement of these **electrolytes** seems to be attributable to the increase of the **sintered** pellet d. with the enhancement of the lithium concn. at the grain boundaries.

IT **120479-61-0**, Aluminum lithium titanium phosphate (Al_{0.3}Li_{1.3}Ti_{1.7}(PO₄)₃) **120479-62-1**, Lanthanum lithium titanium phosphate (La_{0.5}Li_{1.5}Ti_{1.5-2}(PO₄)₃) **120479-63-2**, Lithium titanium yttrium phosphate (Li_{1-1.5}Ti_{1.5-2}Y_{0-0.5}(PO₄)₃) **120479-64-3**, Lithium scandium titanium phosphate (Li_{1-1.5}Sc_{0-0.5}Ti_{1.5-2}(PO₄)₃) **120479-65-4**, Aluminum

lithium titanium phosphate ($\text{Al}_0\text{-}0.5\text{Li}_1\text{-}1.5\text{Ti}_1.5\text{-}2(\text{PO}_4)_3$)
127660-06-4, Iron lithium titanium phosphate
 ($\text{Fe}_0\text{-}0.5\text{Li}_1\text{-}1.5\text{Ti}_1.5\text{-}2(\text{PO}_4)_3$) **127660-07-5**, Gallium lithium
 titanium phosphate ($\text{Ga}_0\text{-}0.5\text{Li}_1\text{-}1.5\text{Ti}_1.5\text{-}2(\text{PO}_4)_3$) **127660-08-6**
 , Chromium lithium titanium phosphate ($\text{Cr}_0\text{-}0.7\text{Li}_1\text{-}1.7\text{Ti}_1.3\text{-}2(\text{PO}_4)_3$)
127660-09-7, Lithium titanium phosphate silicate
 ($\text{Li}_1.4\text{Ti}_2(\text{PO}_4)_2.6(\text{SiO}_4)_0.4$) **127660-10-0**, Lithium titanium
 phosphate silicate ($\text{Li}_1.3\text{Ti}_2(\text{PO}_4)_2.7(\text{SiO}_4)_0.3$) **127660-11-1**
 , Lithium titanium phosphate silicate ($\text{Li}_1.2\text{Ti}_2(\text{PO}_4)_2.8(\text{SiO}_4)_0.2$)
127672-84-8, Lithium titanium phosphate silicate
 ($\text{Li}_1.5\text{Ti}_2(\text{PO}_4)_2.5(\text{SiO}_4)_0.5$) **127673-06-7**, Lithium lutetium
 titanium phosphate ($\text{Li}_1\text{-}1.5\text{Lu}_0\text{-}0.5\text{Ti}_1.5\text{-}2(\text{PO}_4)_3$) **127673-07-8**
 , Indium lithium titanium phosphate ($\text{In}_0\text{-}0.5\text{Li}_1\text{-}1.5\text{Ti}_1.5\text{-}2(\text{PO}_4)_3$)
127689-78-5, Lanthanum lithium titanium phosphate
 ($\text{La}_0.3\text{Li}_1.3\text{Ti}_1.7(\text{PO}_4)_3$) **127887-18-7**, Lithium scandium
 titanium phosphate ($\text{Li}_1.3\text{Sc}_0.3\text{Ti}_1.7(\text{PO}_4)_3$)
 (ionic cond. and porosity and structure of)

RN 120479-61-0 HCA

CN Aluminum lithium titanium phosphate ($\text{Al}_0.3\text{Li}_1.3\text{Ti}_1.7(\text{PO}_4)_3$) (9CI)
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
Al	0.3	7429-90-5

RN 120479-62-1 HCA

CN Lanthanum lithium titanium phosphate ($\text{La}_0\text{-}0.5\text{Li}_1\text{-}1.5\text{Ti}_1.5\text{-}2(\text{PO}_4)_3$)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2
La	0 - 0.5	7439-91-0

RN 120479-63-2 HCA

CN Lithium titanium yttrium phosphate ($\text{Li}_1\text{-}1.5\text{Ti}_1.5\text{-}2\text{Y}_0\text{-}0.5(\text{PO}_4)_3$)
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Y	0 - 0.5	7440-65-5
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2

RN 120479-64-3 HCA

CN Lithium scandium titanium phosphate ($\text{Li}1-1.5\text{Sc}0-0.5\text{Ti}1.5-2(\text{PO}_4)_3$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Sc	0 - 0.5	7440-20-2
Li	1 - 1.5	7439-93-2

RN 120479-65-4 HCA

CN Aluminum lithium titanium phosphate ($\text{Al}0-0.5\text{Li}1-1.5\text{Ti}1.5-2(\text{PO}_4)_3$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2
Al	0 - 0.5	7429-90-5

RN 127660-06-4 HCA

CN Iron lithium titanium phosphate ($\text{Fe}0-0.5\text{Li}1-1.5\text{Ti}1.5-2(\text{PO}_4)_3$) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2
Fe	0 - 0.5	7439-89-6

RN 127660-07-5 HCA

CN Gallium lithium titanium phosphate ($\text{Ga}0-0.5\text{Li}1-1.5\text{Ti}1.5-2(\text{PO}_4)_3$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====+=====+=====		
O4P	3	14265-44-2
Ga	0 - 0.5	7440-55-3
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2

RN 127660-08-6 HCA

CN Chromium lithium titanium phosphate ($\text{Cr}0-0.7\text{Li}1-1.7\text{Ti}1.3-2(\text{PO}_4)_3$)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Cr	0 - 0.7	7440-47-3
Ti	1.3 - 2	7440-32-6
Li	1 - 1.7	7439-93-2

RN 127660-09-7 HCA

CN Lithium titanium phosphate silicate (Li_{1.4}Ti₂(PO₄)_{2.6}(SiO₄)_{0.4})
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.4	17181-37-2
O4P	2.6	14265-44-2
Ti	2	7440-32-6
Li	1.4	7439-93-2

RN 127660-10-0 HCA

CN Lithium titanium phosphate silicate (Li_{1.3}Ti₂(PO₄)_{2.7}(SiO₄)_{0.3})
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.3	17181-37-2
O4P	2.7	14265-44-2
Ti	2	7440-32-6
Li	1.3	7439-93-2

RN 127660-11-1 HCA

CN Lithium titanium phosphate silicate (Li_{1.2}Ti₂(PO₄)_{2.8}(SiO₄)_{0.2})
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4Si	0.2	17181-37-2
O4P	2.8	14265-44-2
Ti	2	7440-32-6
Li	1.2	7439-93-2

RN 127672-84-8 HCA

CN Lithium titanium phosphate silicate (Li_{1.5}Ti₂(PO₄)_{2.5}(SiO₄)_{0.5})
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====

O4Si	0.5	17181-37-2
O4P	2.5	14265-44-2
Ti	2	7440-32-6
Li	1.5	7439-93-2

RN 127673-06-7 HCA

CN Lithium lutetium titanium phosphate (Li1-1.5Lu0-0.5Ti1.5-2(PO4)3)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.5 - 2	7440-32-6
Lu	0 - 0.5	7439-94-3
Li	1 - 1.5	7439-93-2

RN 127673-07-8 HCA

CN Indium lithium titanium phosphate (In0-0.5Li1-1.5Ti1.5-2(PO4)3)
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
In	0 - 0.5	7440-74-6
Ti	1.5 - 2	7440-32-6
Li	1 - 1.5	7439-93-2

RN 127689-78-5 HCA

CN Lanthanum lithium titanium phosphate (La0.3Li1.3Ti1.7(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Li	1.3	7439-93-2
La	0.3	7439-91-0

RN 127887-18-7 HCA

CN Lithium scandium titanium phosphate (Li1.3Sc0.3Ti1.7(PO4)3) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	1.7	7440-32-6
Sc	0.3	7440-20-2
Li	1.3	7439-93-2

- CC 76-1 (Electric Phenomena)
- ST ionic cond lithium titanium phosphate system; cond lithium titanium phosphate solid **electrolyte**
- IT Crystal structure
(of lithium titanium phosphate-based solid **electrolytes**)
- IT Electric conductivity and conduction
(ionic, of lithium titanium phosphate-based solid **electrolytes**)
- IT 30622-39-0 **120479-61-0**, Aluminum lithium titanium phosphate ($\text{Al}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) **120479-62-1**, Lanthanum lithium titanium phosphate ($\text{La}_{0.5}\text{Li}_{1.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **120479-63-2**, Lithium titanium yttrium phosphate ($\text{Li}_{1.5}\text{Ti}_{1.5-2}\text{Y}_{0.5}(\text{PO}_4)_3$) **120479-64-3**, Lithium scandium titanium phosphate ($\text{Li}_{1.5}\text{Sc}_{0.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **120479-65-4**, Aluminum lithium titanium phosphate ($\text{Al}_{0.5}\text{Li}_{1.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **127660-06-4**, Iron lithium titanium phosphate ($\text{Fe}_{0.5}\text{Li}_{1.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **127660-07-5**, Gallium lithium titanium phosphate ($\text{Ga}_{0.5}\text{Li}_{1.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **127660-08-6**, Chromium lithium titanium phosphate ($\text{Cr}_{0.7}\text{Li}_{1.7}\text{Ti}_{1.3-2}(\text{PO}_4)_3$) **127660-09-7**, Lithium titanium phosphate silicate ($\text{Li}_{1.4}\text{Ti}_2(\text{PO}_4)_2.6(\text{SiO}_4)_0.4$) **127660-10-0**, Lithium titanium phosphate silicate ($\text{Li}_{1.3}\text{Ti}_2(\text{PO}_4)_2.7(\text{SiO}_4)_0.3$) **127660-11-1**, Lithium titanium phosphate silicate ($\text{Li}_{1.2}\text{Ti}_2(\text{PO}_4)_2.8(\text{SiO}_4)_0.2$) **127672-84-8**, Lithium titanium phosphate silicate ($\text{Li}_{1.5}\text{Ti}_2(\text{PO}_4)_2.5(\text{SiO}_4)_0.5$) **127673-06-7**, Lithium lutetium titanium phosphate ($\text{Li}_{1.5}\text{Lu}_{0.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **127673-07-8**, Indium lithium titanium phosphate ($\text{In}_{0.5}\text{Li}_{1.5}\text{Ti}_{1.5-2}(\text{PO}_4)_3$) **127689-78-5**, Lanthanum lithium titanium phosphate ($\text{La}_{0.3}\text{Li}_{1.3}\text{Ti}_{1.7}(\text{PO}_4)_3$) **127887-18-7**, Lithium scandium titanium phosphate ($\text{Li}_{1.3}\text{Sc}_{0.3}\text{Ti}_{1.7}(\text{PO}_4)_3$)
(ionic cond. and porosity and structure of)
- IT 12057-24-8, Lithium oxide, properties 13843-41-9, Lithium pyrophosphate ($\text{Li}_4\text{P}_2\text{O}_7$)
(ionic cond. and porosity of solid **electrolytes** contg. lithium titanium phosphate and)
- L24 ANSWER 10 OF 10 HCA COPYRIGHT 2002 ACS
- 112:129692 Lithium ion conductive solid **electrolyte**. Adachi, Ginya; Aono, Hiromichi (Fac. Eng., Osaka Univ., Suita, 565, Japan). Kagaku (Kyoto, Japan), 44(11), 766-7 (Japanese) 1989. CODEN: KAKYAU. ISSN: 0451-1964.
- AB Recent progress of lithium ion conductive solid **electrolytes** is reviewed with 11 refs., mainly on the lithium titanium phosphate of $\text{Li}_{1+x}\text{M}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ which has an ionic cond. as high as 10^{-4} S/cm at room temp. Partial substitution of Ti^{4+} by M, e.g., by Al^{3+} , Y^{3+} , or La^{3+} enhances the ionic cond., e.g., up to 10^{-3} S/cm for the $\text{Li}_{1+x}\text{Al}_x\text{Ti}_{2-x}(\text{PO}_4)_3$ system. This enhancement might be attributed to the dense formation of the solid **electrolyte sinter**.
- IT **125810-42-6**, Lanthanum lithium titanium phosphate

((La,Ti)₂Li₁₋₃(PO₄)₃) **125810-43-7**, Lithium titanium
yttrium phosphate (Li₁₋₃(Ti,Y)₂(PO₄)₃) **125810-44-8**,
Aluminum lithium titanium phosphate (Al₀₋₂Li₁₋₃Ti₀₋₂(PO₄)₃)
(ion-conductive solid **electrolyte**)

RN 125810-42-6 HCA

CN Lanthanum lithium titanium phosphate ((La,Ti)₂Li₁₋₃(PO₄)₃) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	0 - 2	7440-32-6
Li	1 - 3	7439-93-2
La	0 - 2	7439-91-0

RN 125810-43-7 HCA

CN Lithium titanium yttrium phosphate (Li₁₋₃(Ti,Y)₂(PO₄)₃) (9CI) (CA
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Y	0 - 2	7440-65-5
Ti	0 - 2	7440-32-6
Li	1 - 3	7439-93-2

RN 125810-44-8 HCA

CN Aluminum lithium titanium phosphate (Al₀₋₂Li₁₋₃Ti₀₋₂(PO₄)₃) (9CI)
(CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O4P	3	14265-44-2
Ti	0 - 2	7440-32-6
Li	1 - 3	7439-93-2
Al	0 - 2	7429-90-5

CC 76-0 (Electric Phenomena)

ST review lithium ion conductive solid **electrolyte**

IT **Electrolytes**

(solid, lithium-ion-conductive)

IT **125810-42-6**, Lanthanum lithium titanium phosphate
((La,Ti)₂Li₁₋₃(PO₄)₃) **125810-43-7**, Lithium titanium
yttrium phosphate (Li₁₋₃(Ti,Y)₂(PO₄)₃) **125810-44-8**,
Aluminum lithium titanium phosphate (Al₀₋₂Li₁₋₃Ti₀₋₂(PO₄)₃)
(ion-conductive solid **electrolyte**)

=> d 120 1-5 ti

- L20 ANSWER 1 OF 5 HCA COPYRIGHT 2002 ACS
TI Ionic conductivity of $\text{Li}_{3-2x}(\text{Sc}_{1-x}\text{Zr}_x)_2(\text{PO}_4)_3$ thin film prepared by sputtering method
- L20 ANSWER 2 OF 5 HCA COPYRIGHT 2002 ACS
TI Lithium insertion in vanadyl phosphate
- L20 ANSWER 3 OF 5 HCA COPYRIGHT 2002 ACS
TI A novel fast lithium-ionic conductor
- L20 ANSWER 4 OF 5 HCA COPYRIGHT 2002 ACS
TI Alpha-decay-induced condensation of phosphate anions in a mineral
- L20 ANSWER 5 OF 5 HCA COPYRIGHT 2002 ACS
TI Detection of lithium by thin plastic foils